TELEPHONE ENGINEER

Entered as second-class matter at the post office at Chicago, Ill., under the Act of March 3, 1879.

Volume XXIII *SEPTEMBER, 1920* *Number 3*

Published Monthly, at 53 West Jackson Boulevard, Chicago, Ill., $2.00 per year.

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ECONOMY?

The study of any business or industry will reveal small losses of time and material which in the course of a year eat up a goodly portion of its earnings. These losses may seem trivial at first notice but when they are all considered and figured out they amount to much larger sums than can usually be spared.

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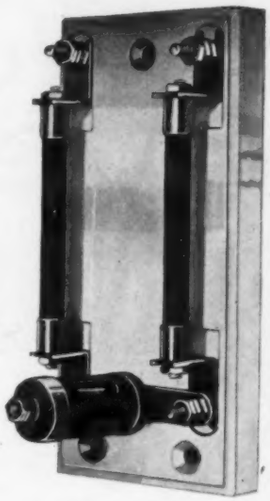

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Toning Machines for Musical Instrument Wires and The Geophone, a French Listening Device

Photos by Underwood & Underwood.

In the above square, Frank E. Morton, acoustic expert, is shown "listening in" on the Toning Machine. This machine consists of a set of harmonic forks actuated electrically; below Mr. Morton is seen adjusting the master fork.

(Circles.) The Geophone, an instrument developed by U. S. engineers and used by Allied armies during the War to reveal sapping and underground mining operations by Germans.

TELEPHONE ENGINEER

Published on the First of the Month by the Telephone Engineer Co., 53 West Jackson Blvd., Chicago, $2.00 Per Year
H. B. McMeal, Editor: J. M. Graffis, Advertising Manager

VOL. XXIV Chicago, September, 1920 No. 3

Editorial Mention

Bell Should Buy Independent Telephones

A quarter of a million Americans are waiting—not for the telephone operator to give them a number but for the Bell companies to install telephones.

And there are indications they will be waiting for some time yet—maybe two or three years. And then when their orders have been filled there probably will be many more applicants clamoring for telephones in the United States, where more than two-thirds of all the phones in the world are located.

There is no need for this condition, and it would not exist to any great extent, if the Bell operating companies were permitted to install telephones other than Western Electric make.

Independent manufacturers are turning out telephones equal in every way to Bell instruments, and it is short-sighted policy, on the Bell's part to deny the public service when it is so unnecessary.

Is the Telephone Changing the Voice?

That the use of the telephone is bringing about greater similarity of accent in different parts of the country and is tending so to change the voices of the nation that northerner and southerner, easterner and westerner are gradually losing their characteristics intonation is the belief of scientists who are familiar with the matter.

Furthermore, the president of a southern telephone company observes that the southern accent, too, is rapidly disappearing. There are many causes, he points out—the southerner travels more, he uses the language of commerce today, where thirty years ago it was the language of literature. But above all looms the fact that the long distance telephone is used so much more generally and so frequently. The use of the telephone, little as the casual onlooker may think of it, is bringing all normal voices to a sameness of pitch and engrafting a similarity in enunciation. In fact, the telephone is gradually changing the voices of all of us.

It is thought by some that all this is due more to the feeling of the telephone user that the person he is talking to is some distance away than to any necessity caused by the instrument itself. People generally are apt to raise their voice when using the telephone much higher than there is any need. Of course, when using the long distance telephone there is greater necessity for speaking louder and more distinctly than when speaking over a local line.

AN IMPORTANT ORDER

The Michigan Public Utilities Commission has ordered the Michigan State Telephone Company to install devices for instantaneous disconnect and instantaneous recall in all Detroit exchanges not to be superseded by automatic installation within five years.

This is a sweeping order in the interests of service and is a recognition of modern equipment made by the Kellogg Switchboard & Supply Company, Chicago, an independent telephone manufacturer.

Bell service could be made more efficient by further orders requiring the installation of other modern Independent apparatus.

Great Britain Establishes a Radio Board

A Radio Research Board has been established in Great Britain by the Department of Scientific and Industrial Research to co-ordinate and develop researches into wireless telegraphy and telephony at present being undertaken by governmental departments, with the following membership: Admiral of the Fleet, Sir Henry B. Jackson, F. R. S., chairman; Commander J. S. Salmond, R. N., Lieut.-Col. A. G. T. Cusins, Wing-Commander A. D. Warrington Morris, E. H. Shaughnessy, and Prof. J. E. Petavel, F. R. S., representing the Admiralty, War Office, Air Ministry, Postoffice, and Department of Scientific and Industrial Research respectively; and Prof. Sir Ernest Rutherford, F. R. S.

Telephone Pioneers to Meet at Montreal

The seventh annual meeting of the Telephone Pioneers of America will be held at Montreal, Quebec, Canada, Sept. 10 and 11.

A business meeting, banquet, sight-seeing tour through the beautiful city and other entertainment is planned for the delegates. It is estimated the attendance will be larger this year than at any previous meetings as the membership is increasing rapidly.

A Series of Tests

To Insure Successful Operation of Machine Ringing When Cutting Over from Manual Ringing

By H. M. BOLLINGER

A NEW SERIES OF ARTICLES

Mr. Howard M. Bollinger, who began a series of technical articles in last issue, has had a wide experience in telephone work. He is at present engaged in preparing a new section of maintenance instructions on private branch exchanges and sub-station work, containing approximately 100,000 words and about 300 illustrations. Telephone men will find much of interest and profit in this series of articles by Mr. Bollinger.

WHEN a large group of stations is transferred from a manual ringing equipment to a machine ringing equipment it is important to know that successful operation will result.

This knowledge can only be obtained by tests of both the lines which are involved, and of the machine ringing trunks, or cords, with which they will be rung.

Tests of common station lines are made principally to determine that premature tripping, either occasional or frequent, will not result; it being generally assumed that with common stations, that failure to trip during either the silent or ringing interval will not result on lines from which no complaint of supervision difficulty has been received and to which no excessively high resistance cable pairs are connected.

Tests of P. B. X. trunks having ring-down drops at the branch are ordinarily made on the same basis as common stations, but tests of trunks to lamp type P. B. X.'s are made also to determine that prompt and positive tripping of ringing will result during the ringing interval when the P. B. X. operator answers with the standard sequence of operation (i. e., plugs in calling trunk and then opens listening key). The reason for the difference being that many drop type P. B. X. trunks will not trip the machine ringing promptly during the ring, owing to the high ringing frequency impedence of the operator's telephone and cord circuits, unless special circuits are installed at each P. B. X.; and, owing to the undesirability of so complicating these switchboards, the operators are instructed to answer only when the drop is not "buzzing" (a performance which, in the absence of instruction, they soon learn after having received a few "rings in the ear").

The "lamp" type boards, however, unavoidably will answer about one-third of their incoming trunk calls during the ring, and it is therefore imperative that prompt and positive tripping of the ringing current will result under this condition, or many complaints will be received. Therefore, for these types of boards, tests are made also to determine that prompt tripping during the ring will result.

Ordinarily no tests are required for assurance of positive silent interval tripping on any character of line, as this is a direct current operation, the same as the ordinary supervision, and will ordinarily be more positive over high resistance circuits than supervision.

In this article only machine ringing systems permitting tripping during the ring, without the assistance of superimposed battery will be considered.

TESTS OF MACHINE RINGING CIRCUITS

The fundamental machine ringing circuit operation involves two relays, as shown in Figure 1.

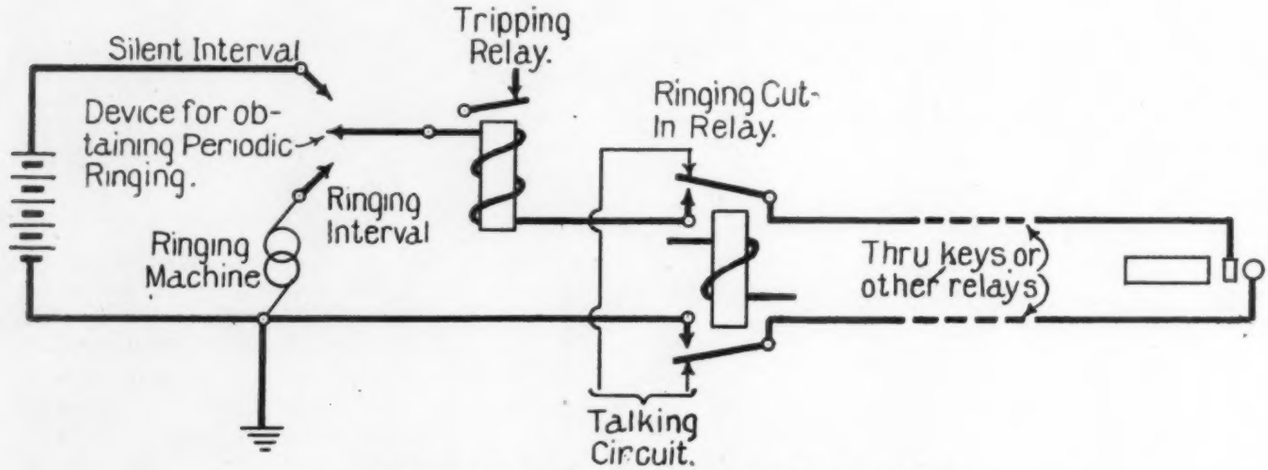


Fig. 1.—Diagram Illustrating Theory of Machine Ringing Circuits.

The circuit operation is ordinarily such that upon connecting to the called line, the ringing cut-in relay operates and ringing occurs; the ringing current flowing through

the tripping relay winding being insufficient to cause operation of this relay. Upon call being answered, the impedance to the ringing current (or resistance to the silent interval battery) is considerably lowered, and the tripping relay being in marginal adjustment now operates, permitting a slow operating relay (not shown) to cause the release of the ringing cut-in relay, which then interrupts the ringing circuit and establishes talking conditions. The purpose of the slow relay mentioned is to prevent premature tripping when the armature of the tripping relay is but momentarily operated, such as by a brief sparking of protector carbons, or by the rather high surge current which flows when the first alternation of ringing current following the silent interval is of opposite polarity to the silent interval battery.

Mention in the following will only be made to the tests relating to the tripping relay and ringing source, although, as will be seen from the above, the perfection of service is dependent to a certain degree also upon the refined adjustment of the controlled relays.

After installation the tripping relays are inspected for mechanical condition and then gauged as to armature travel, air gap, etc. Then they are adjusted, by varying the spring pressure, until they meet certain operating and non-operating direct current requirements. If proper current flow values are used and if the ringing current has proper characteristics (i. e., voltage, frequency, and wave form), relays so adjusted will generally give very satisfactory service, but assurance that the tripping relays will probably function is had by testing them a number of times, before they are placed in service, by means of a routine test circuit representing the extremes of the actual service to which they will be subjected.

Such a circuit is arranged to give both the effect of the extreme permissible tripping loop and that of the extreme permissible ringing load as shown in Figs. 2 and 3.

The inductive apparatus used in such circuits should be selected by comparative resistance and impedance tests, and the condensers by a balistic or other capacity test.

When using these circuits for the first test of the tripping relays it is usually desirable that maximum permissible ringing voltage and minimum permissible ringing frequency obtain when using the maximum ringing load, and that minimum voltage and maximum frequency obtain when using the maximum tripping loop. Variation of ringing frequency for such tests, where belted machines are used, may be obtained by temporarily taping the driving or driven pulley. Ordinarily 5 percent variations from the rated operating voltage and frequency are assumed to represent the extremes, although a cyclic frequency variation in excess of 5 percent sometimes is found where the ringing machine is driven with a belt of un-uniform thickness. Frequency variations can be easily observed on the reed type frequency meters.

The reason for using the low frequency and high voltage as one

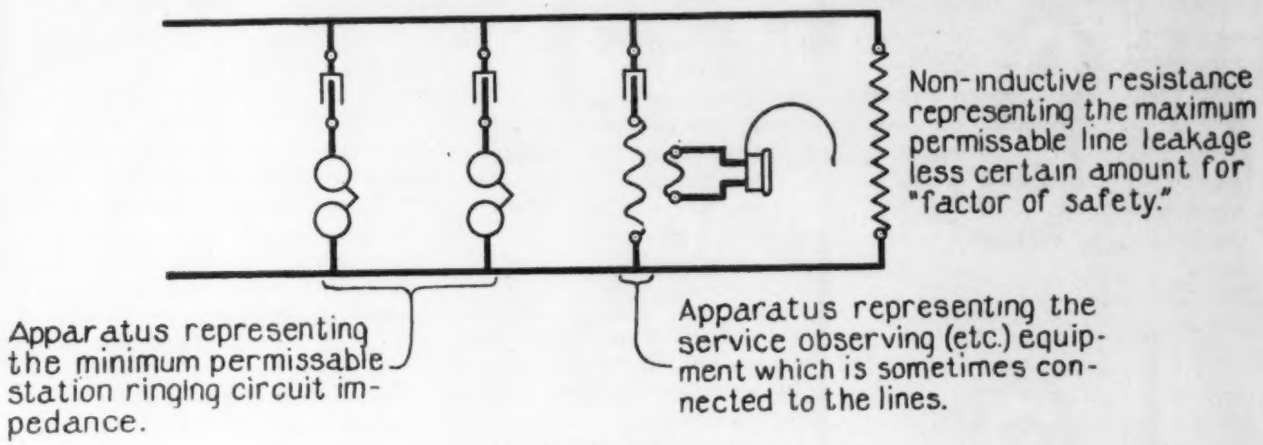

Non-inductive resistance representing the maximum permissable line leakage less certain amount for "factor of safety."
Apparatus representing the minimum permissable station ringing circuit impedance.
Apparatus representing the service observing (etc.) equipment which is sometimes connected to the lines.

Fig. 2.—Maximum Ringing Load.

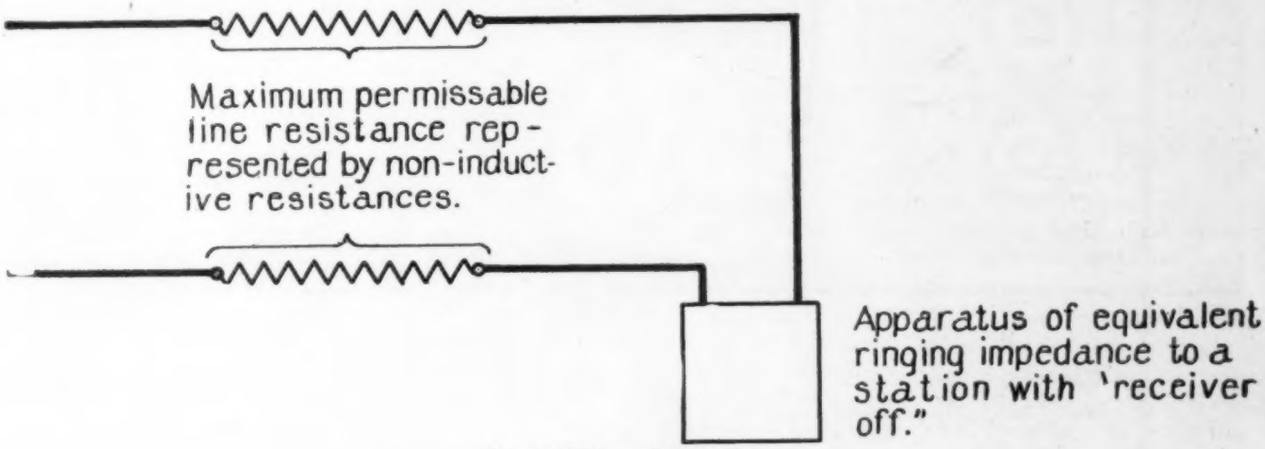

Maximum permissable line resistance represented by non-inductive resistances.
Apparatus of equivalent ringing impedance to a station with 'receiver off."

Fig. 3—Maximum Tripping Loop.

extreme is because such telephone station ringing circuits are ordinarily resonant at frequencies below normal ringing frequency.

The alternating current flowing through the tripping relay under maximum ringing load conditions, for illustration, may be 55 mil-amperes and under maximum tripping loop condition possibly 70 mil-amperes, the test requirements being absence of premature tripping on the former, and prompt and positive tripping on the latter.

TESTS OF LINES WHICH ARE TO BE RUNG WITH MACHINE RINGING

Test for Over-Capacity

Certain maximum ringing circuit capacity of all station lines in the district is set as a standard. Ordinarily this is 4 MF, and in most cases will be the same as the multiple capacity of the condensers in the station part of the routine test circuit representing the maximum ringing load.

Test of all lines, with low resistance voltmeter (about 3,000 ohms), from the central office multiple is made to detect any over capacity lines. Where P. B. X. lines are involved they are tested under both night and day conditions to detect over-capacity of P. B. X. trunk circuit, or of night connected stations or station group.

Over-capacity conditions are ordinarily corrected by re-arranging station ringing circuits to standard plans for machine ringing districts, and not by changing to lower capacity condensers, as this latter sometimes leaves the ringing load still excessive (i. e., too low impedance at ringing frequency).

TEST FOR LOW INSULATION RESISTANCE

This is ordinarily made with a high resistance voltmeter such as the 100,000 ohm types, testing from the multiple jacks. But few of the leaks ordinarily considered as trouble on such tests are of real consequence to machine ringing, but a high standard of insulation, during both dry and wet weather, makes a district stable and little affected by the changing atmospheric conditions, and this is a particularly desirable condition where machine ring is employed.

Test for Persistent Breakdowns

Properly cleaned carbons separated about .0055 will not spark until the voltage across the gap approaches 400.

Owing to lightning inductive kicks, and to telephone circuit kicks and other abnormal voltages, sparks pass, at times, through nearly all carbon protectors and cause a gradual piling up of carbon dust on the separated surfaces, which, by reducing the air-gap, makes the carbons more and more liable to spark at ordinary ringing voltages.

Small spark gaps also occur at other points, such as due to line wire insulation wearing through in trees, or to a milonite nail driven through the insulation of two inside wires, touching one conductor and near the other, etc., and will show trouble when testing for carbon breakdowns.

Such troubles as are classed as breakdowns ordinarily show clear on low voltage tests, such as 40 V or 100 V voltmeter test, but permit heavy flow of current, by sparking, when source is of higher voltage, such as ringing current, or breakdown test current. Generally the trouble disappears when the high voltage is disconnected, but in some few cases a closed circuit will remain.

Where machine ringing voltage of about 100 is to be used, the peak voltage during actual ring is usually less than 150 and, in such a district, test for breakdowns is ordinarily made with 200 volts.

Many methods of making known the presence of the abnormal current, when breakdown occurs, are used, such as those using mil-ammeters, marginal adjusted relays, etc., but, for the purpose of this description, the most simple test circunt using the lamp glow as the trouble indicator, will suffice. Such a circuit is shown in Fig. 4.

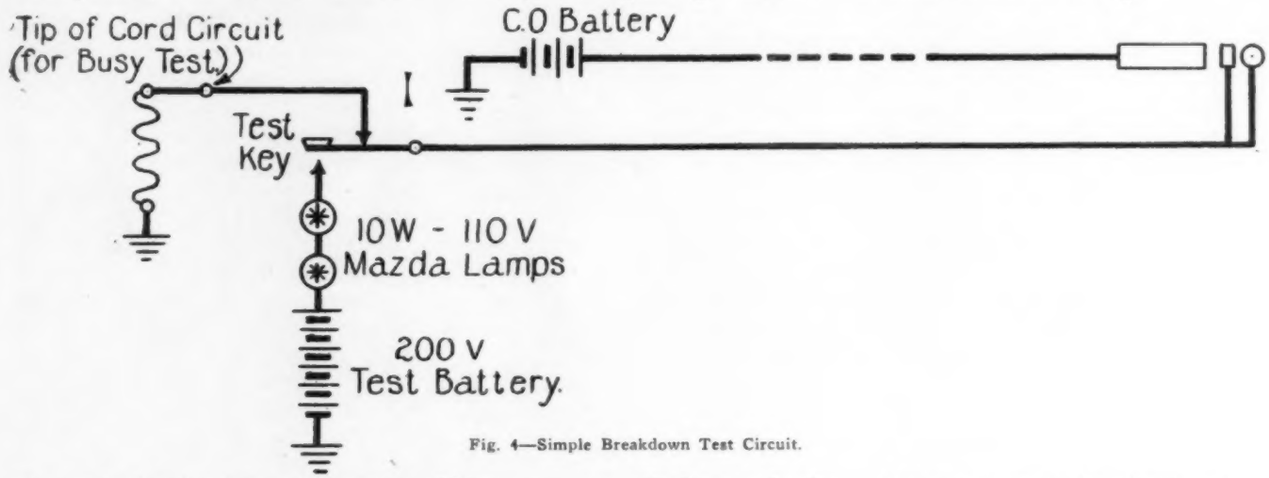


Fig. 4—Simple Breakdown Test Circuit.

The test is made by plugging in the jacks at the central office and then depressing the test key, causing the potential of the two wires of the line to be raised to about 200 volts. Lines permitting the mazda lamps to flash each time key is pressed or which permit the lamps to burn for a considerable period while test key is depressed, are considered in trouble; lines which permit no flash, or but one single flash, which does not repeat with several subsequent operations of the test key, are considered as not in trouble (from this standpoint).

Probably less than one-third of the lines considered in trouble by this test will actually cause premature tripping at this time, but all classed as trouble will probably develop into a real service affecting condition in a few months or pos-

sibly a year, and therefore, all should be corrected.

While the test as described will give satisfactory test results, some unnecessary annoyance will be occasioned some of the subscribers due to the sudden application and withdrawal of the 200 volts causing the party line station bells to tap.

This difficulty is overcome by first slowly charging the line through a high resistance, then applying the low resistance of the lamp test circuit, and then slowly discharging the line through the high resistance. To properly perform this operation a slow operating sequence type of key is generally used.

The unnecessary bell tapping can also be prevented by arranging the test circuit so that a very large capacity is permanently connected between the tip and ring of the test plug and ground, and a high inductance and a certain resistance is included in the circuit between the test key and the large capacity condenser. The effect of this arrangement being to make the charge and discharge the line circuit occur slowly, and thus eliminate bell tapping.

When special electrical circuit constants are used to obtain the slow charging effect it is necessary that the resistance of the inductive part of the circuit be such that it will measure over 1-5 of the critical non-oscillatory resistance) in order that voltages in excess of the test battery voltage will not be impressed on the lines being tested.

Tapping of the station bells when actual breakdown occurs is unavoidable, but as these cases affect relatively few lines, little complaint is received from this source.

Carbons which test perfectly clear at 200 volts will be heard to spark, at times, during normal service, even when no nearby lightning disturbances are present. These sparks are mostly due to certain unfortunate high voltages, of brief duration, which develop in the telephone plant itself.

To illustrate such a case, consider the effects present when a manual ringing key is released while ringing a line having metallic condensers, if the key is (as about half of the keys are) adjusted so that the ground side of the ringing springs breaks before the ringing side, as shown in Fig. 5.

In the illustration the following frequently occuring conditions are assumed.

1. That the ground spring broke contact when the negative peak ringing voltage was present across the condenser.
2. That a certain interval of time has elapsed since the negative peak voltage was present across the condenser and that the ringing spring has not yet broken contact.
3. That the positive peak ringing voltage is now present on the ringing mains.
4. That the voltage drop in resistance lamp is negligible while ringing.
5. That the ringing voltage is sine.
6. That the inductance and resistance of the ringer is such that the peak condenser voltage equals the impressed peak.

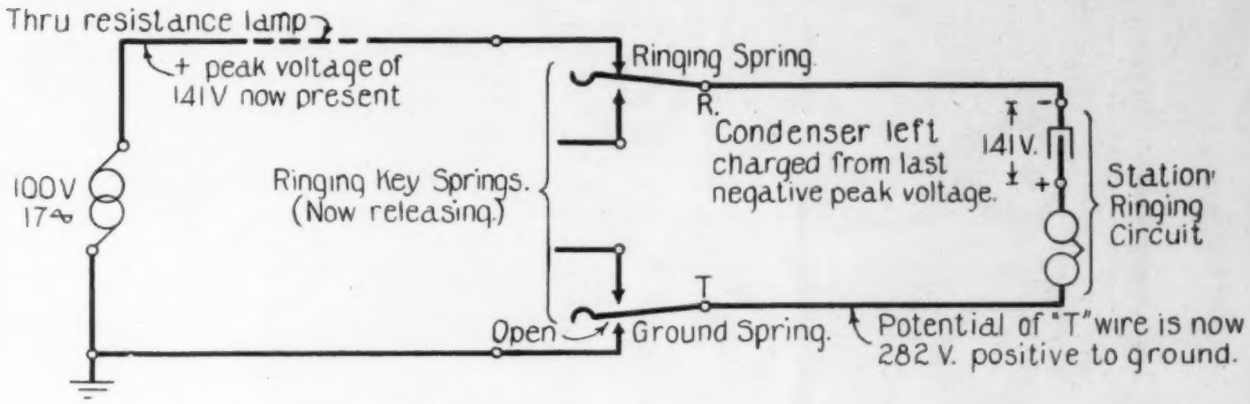


Fig. 5.—Diagram of a Source of Abnormal Voltage.

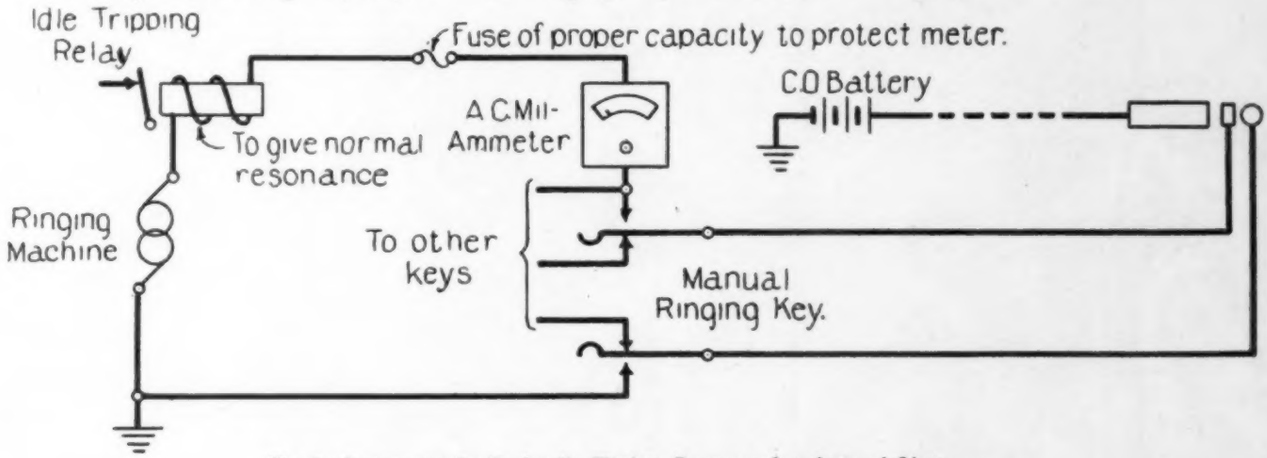


Fig. 6.—Arrangement for Testing the Ringing Frequency Impedance of Lines.

From the illustration it will be seen that 282 volts is transiently tested clear at 200 volts may briefly spark.

Owing to the voltage across the condenser ordinarily exceeding the impressed voltage (due to partial resonance) and to the current ordinarily departing somewhat from a true sine, the resulting voltages often exceed those shown in Fig. 6.

Test for Improper Impedance

After completion of the tests of the machine ringing trunks (or cord circuits) it is known that the most sensitive tripping relay will not falsely operate while ringing the maximum load of the test circuit.

Now, if it is known that no line in service will demand more current from the ringing source, while being rung, than is demanded by the maximum load, it is then known that premature operation of the tripping relays, while ringing these lines, will be very improbable.

It is the purpose of the test for improper impedance, to detect lines which will demand more current from the ringing source than the maximum load of the routine test circuit. The test for improper impedance is only made after the lines have been brought to a high standard of excellence as judged by the other tests.

The test is made by ringing each direct line station, and one station on each occupied side of each divided ringing party line, with the ringing circuit arrangement shown in Fig. 6.

All lines bridged by observing equipment which permit more ringing current to flow than the maximum load, and all lines not bridged by observing equipment which permit more than a certain few milamperes less than the maximum load to flow, are considered to be "in trouble" of a nature likely to cause premature tripping.

When making this test certain lines having excessively high impedance in the ringing circuit will probably be detected, and, while this condition does not influence machine ringing margins, the correction of the indicated troubles will result in improved quality of the ringing at the affected stations.

The troubles found causing too low impedance to exist on common station lines which satisfactorily passed previous tests are various, but some are as follows:

1. Improper plan wiring causing bell windings to be in multiple instead of in series at stations having several extension bells (at direct or two party stations).
2. Main bell of 500 ohm type where extension bell set containing condenser is used.
3. Four 1 MF condenser bell circuits, with 1,000 ohm bells, in multiple (where 2 parallel condenser and bell groups using only 2—1 or 2 condensers should be used).
4. Where a slip-shod troubleman has shunted out a bell coil (biasing spring side) which has gone open, at station having a condenser extension bell set.

Troubles of these characters are also found at 4 party semi-selective stations where the ringing circuit of the other station on the same side of the line brings the ringing load near the critical condition, being thus equivalent to added extension bell circuits at the direct or two party stations.

The troubles found causing improperly high impedance of station ringing circuits are also various, but illustrations are:

1. Extension bell (in series with 1,000 ohm main bell) being of 2,500 ohm type. This causes quite poor ringing of the main bell.
2. High resistance in the ringing circuit, such as where corrosion has developed into a pasty mass part of one of the conductors leading to an outside bell (as at a lumber yard).
3. Circuits in which main and extension bells connected in series, have both, through an error, seen equip with condensers.

On "lamp" type P. B. X. trunk lines, and other lines having special circuits, etc., the impedance test is also made under the answering as well as the ringing condition. All lines which fail to demand as much current from the ringing source as the maximum tripping loop, when answering, will have difficulty, either intermittently or continually, in tripping during the ring.

With P. B. X.'s this difficulty is usually due to to the absence of, or trouble with, special tripping devices.

CONCLUSION

In practice it has been found that the cost of making such tests as described, when cutting over large groups of stations, is not incommensurate with the good derived, even without considering the value of the assurance that disastrous conditions will not result.

However, when but small groups of stations are involved, the omission of certain of the tests, or of all of these tests, may be justified, particularly if the service is not held in high regard.

Is It True That Spooks Use the Telephone?

Now comes the statement that the spirits are using the telephone. A New York medium claims to receive messages from the other world by the way of the wire, and for a fee where anxious friends can hear direct from their loved ones—by way of the telephone receiver. It is an improvement over the cumbersome cabinet and the often awkward medium who sometimes blunders in the dark.

But there will be those who will accept the statement of the medium, regardless of its absurdity. We may expect soon to see advertisements to the effect that certain persons, for a fee, of course, will make connections with the spirit world and place friends in communication by wire. Nothing is too ridiculous for the impostors to undertake when it comes to dealing with the unknown world, and nothing is too unreasonable for the superstitious to believe.

The best brains in the world are working upon the subject of spiritualism, and honest and serious investigators are giving the question a great deal of study. So far we have nothing but speculation, and the world of over-excitable or senile persons whose minds are easily swayed, as to what can be done in the way of communicating with departed souls. There is not a particle of reliable evidence upon the subject one way or the other. The statement that the dead are conscious of what goes on in this world cannot be proven or disproven.

The Telephone in Foreign Countries

Items of General Interest to Telephone Men From All Parts of The World

By G. P. BUNKER.

Exhibition of Wireless Apparatus at Olympia

AMONG the exhibits to be seen at the Aeronautical Exhibition at Olympia in July, there will be two types of wireless signaling apparatus for use on aeroplanes. Both are the invention of F. Wates. One of these, for use on commercial aeroplanes, consists of an aluminum case measuring about six inches square, and enclosing a mechanism constructed so that it will not readily get out of order under the severe conditions in which it will be used. The front of the instrument has a series of messages engraved on plates in three rows. Alongside the messages are sockets into which a plug is inserted. On the right hand side of the case a handle is fitted. A plug is also provided attached to a lead, and is inserted in the desired socket. A handle is then depressed, and while it slowly returns to the normal position a signal in code is sent in Morse defining the message and preceded by the call sign of the machine. The advantage of the automatic transmitter is twofold. It enables signals to be sent in almost any circumstances, and it can be worked by the pilot himself, so that no operator need be carried.

Japan Plans Extensive Telephone Building

The Japanese Communications Department plans a big extension of the telephone service to be carried into effect during the next eight years beginning with the next fiscal year at the estimated cost of yen 337,000,000. The present number of subscribers in Tokio is to be increased to 152,000; in Osaka to 91,000; in Kyoto to 30,000; in Yokohama to 21,000; in Kobe to 31,000; in Uagoya to 28,000; and in other places to 327,000. The above figures show the proportion of 49 subscribers per 1,000 population for Tokio; Osaka of 44; Kobe of 43; while others come to a rate of 40 or so. By 1926 Kobe will have six telephone exchanges, including the present three, to deal with the proposed extension. The city of Kobe now contains 9,100 or so subscribers, a number which is to be increased to 31,000. The Communications Department is at present studying the automatic exchange system now in use in America and Europe.

A Radio Research Board Established in England

A radio research board has been established in Great Britain by the department of scientific and industrial research to co-ordinate and develop researches into wireless telegraphy and telephony at present being undertaken by government departments, with the following membership: Admiral of the Fleet, Sir Henry B. Jackson, F. R. S., chairman; Commander J. S. Salmond, R. N., Lieut.-Col. A. G. T. Cusins, Wing-Commander A. D. Warrington Morris, Mr. E. H. Shaughnessy and Prof. J. E. Petavel, F. R. S., representing the Admiralty, War Office, Air Ministry, Post Office, and Department of Scientific and Industrial Research respectively; and Prof. Sir Ernest Rutherford, F. R. S.

Europe to Reestablish Wire Communication

The League of Nations was represented, together with various specialists from different states, at the conference which has just completed its work in Paris for the reestablishment of postal, telegraphic and wireless communication in Europe. The council was called by the French government on the initiative of the Communications Section of the Supreme Economic Council. A series of proposals was adopted and will be submitted to the governments concerned, their object being to promote an improvement as rapidly as possible in areas which are outside the ordinary scope of the Postal and Telegraphic Convention, but which are at the same time vital for quick and sure communication between different countries. In order to arrange further meetings to carry out this work, the conference decided to invite the Communication and Transit Section of the League of Nations to take charge of the arrangements for further meetings in collaboration with the postal, telegraphic, and wireless administrations of the various countries. It was announced that the German wireless stations are in full and unrestricted operation again.

Costa Rica Declares Telephone Monopoly

By a decree of the Provisional Government of Costa Rica, wireless telephones are declared state monopolies. Consul Chase has forwarded to Washington a translation of the decree which, among other provisions, states that permissions granted for wireless installations now established in the country may be revoked at any time and the respective plants may pass to the power of the state, with proper indemnification. Furthermore, Article IV limits "the establishment, management, and exploitation of the enterprise of wireless telephony for international service to persons of Costa Rica origin, singly or in corporation, under the supervision and protection of the state."

Comment on Michigan Ruling

Utilities Commission Ruling Is One of Fairness and Favors Independent Telephone Apparatus

AN IMPORTANT order has been issued by the Michigan public utilities commission in the Detroit rate case, in which the Michigan State Telephone Company is required to install Independent devices in Detroit exchanges. Clause 5 of the official order reads:

> The Michigan State Telephone Company shall, as soon as it is reasonably practicable to do so, install devices for instantaneous disconnect and instantaneous recall in all Detroit exchanges not to be superseded with automatic installation within five years, and shall make any and all other reasonable improvements to benefit its service.

In its opinion accompanying the official order the commission quotes from the 1920 report of Prof. Burch that "apparatus should be installed to signal for disconnection and also for instantaneous recall." The opinion further states:

> "In the report of the investigation committee appointed February 14, 1919, by the Wisconsin State Telephone Association, it is said that the telephone subscriber has a right to expect a fast answer, a reliable connection, notification that the call is being taken care of, good transmission, prompt disconnection after conversation is completed, noninterference in communication, and courteous treatment.
>
> "It is pointed out that the art of telephony up to the present offers distribution of calls, traffic and load, instantaneous listening, machine ringing (periodic), instantaneous disconnection, instantaneous recall signal, ringing control, dark key shelf for manual board, revertive ringing tone, automatic peg count, and secret service.
>
> "The signal for disconnection increases efficient operation by enabling the operators to avail themselves of the used line for incoming calls upon the receiver being hung up, signaling the switchboard operator that the iniitial call is completed. Instantaneous recall enables a subscriber to promptly signal the central switchboard operator by lighting a signal lamp in front of her. The result aimed at by both devices recommended by Prof. Burch is quicker, more accurate and satisfactory service.
>
> "It is generally conceded by all telephone managers outside the American Telephone & Telegraph Company group that these devices improve telephone service and should be adopted where manual methods of switching are continued in use."

The Michigan commission is to be congratulated for this order, which will insure more efficient service for Detroit telephone subscribers.

The fundamental and most important phase of the decision is service. This harks back to the distinction that has always been present between the Western Electric Company on one hand and the Independents on the other as to the goal at which to aim.

The Independents have always judged everything from the standard of service to the subscriber, and this explains the many improvements they have made.

The Western Electric Company has consistently insisted on a standard of apparatus; that is, one of convenience from a manufacturing standpoint, rather than the convenience of the telephone user and the operator. They made a fetish of design at the expense of the needs of the field, and failed to change their standards of apparatus in accordance with those needs.

Independent manufacturers have been constantly represented by Bell interests as mere interlopers in the telephone field. However, when the facts of history are studied, the conditions are found to be just the reverse. Practically all of the improvements that have been epoch-making were first brought out and used exclusively by Independents. The Bell companies were forced to adopt them by the weight of public opinion, just as they are now being forced to adopt the instantaneous recall and disconnect by the judicial decision of the Michigan commission.

This is the first instance where a judicial body has seen the light strong enough to order the Bell company to use strictly Independent improvements on their boards. Only a few of the improvements forced on the Bell company by the public demand for them, after this demand had been created by their use in Independent exchanges, need be cited to show the general trend for years past.

Take, for instance, the harmonic party line system, insulated substations, express type combined drop and jack, insulated receiver without exterior binding posts, automatic systems. All of the above improvements, which are now in common use, originated with Independents and, as stated, were exclusively used by them and were not adopted by the Bell companies until they were forced to do so by the demand of the telephone-using public.

Still another important case in point is telephone service throughout farming communities. Veteran telephone men know that the Bell company held to copper wire line building for years, over which results could be obtained with its standard weak generator. But this construction was too expensive for rural lines, and it was not until Independent telephone manufacturers developed a competent ringing or generating apparatus with a practical switching equipment that could be depended upon to signal over long iron wire lines that farmers were enabled to build economically.

Today farmers' telephone lines are one of the biggest and most far-reaching departments of telephone service. Telephone men know that it was not until many years after Independent telephony had brought about this change that the Western Electric Company became aware of the possibilities of this class of telephone service, copying in a wholesale manner Independent apparatus.

When in February, 1919, the Wisconsin Independent Telephone Association appointed a committee to study this matter of service and report, and when that committee

took the subscriber's viewpoint as the foundation on which to build a statement as to what telephone service should consist, they formulated a service code of vast importance, and one that will become national in its effect.

We believe that it will always be remembered that an Independent state association gave the first definition of service to be furnished to a subscriber that has ever been expressed.

In this Wisconsin state committee report the committee says "The subscriber has a right to expect

1. A fast answer
2. A reliable connection
3. Notification that the call is being taken care of
4. Good transmission
5. Prompt disconnect after the conversation is completed
6. Non-interference in communication
7. Courteous treatment"

As aids in securing this service, the committee mentions the following features:

1. Distribution of calls load and traffic
2. Instantaneous listening
3. Machine ringing (periodic)
4. Instantaneous disconnect
5. Instantaneous recall signal
6. Ringing control
7. Dark key shelf for manual board
8. Revertive ringing tone
9. Automatic peg count
10. Secret service

Over 75 percent of these subscribers' features of service outlined by the Wisconsin association and adopted by the decision of the Michigan state utilities commission, were brought into practical, efficient operating by an Independent manufacturer.

Following up the definitions of service from the standpoint of the telephone user as outlined by the Wisconsin committee, the Michigan public utilities commission, in the case of the Michigan State Telephone Company in the city of Detroit, states the proposition in part as follows:

In the report of an investigating committee appointed February 14, 1919, by the Wisconsin Telephone Association, it is said that the telephone subscriber has a right to expect a fast answer, a reliable connection, notification that the call is being taken care of, good transmission, prompt disconnection after conversation is completed, non-interference in communication, and courteous treatment.

It is pointed out that the art of telephony, up to the present, offers distribution of calls, traffic and load, instantaneous listening, machine ringing, (periodic) instantaneous disconnection, instantaneous recall signal, ringing control, dark key shelf for manual board, revertive ringing tone, automatic peg count, and secret service.

"EVERLASTIN' TEAMWORK"
From United Telephone Voice

"It ain't the guns nor armament nor funds that they can pay,
But the close co-operation that makes them win the day.
It ain't the individual, nor the army as a whole
But the everlastin' teamwork of every bloomin' soul!"

With these words Kipling attributed to "Everlastin' Teamwork" the success of the British Army. The lines are absolutely true applied to any successful army, any successful organization or any successful business.

The success of our business does not depend upon the general management alone, the managers alone, the operators alone, or the laborers alone, but it does depend on the general management, the manager, the chief operators, the operators, the bookkeepers, the foremen, the linemen, the cable men, the clerks, the truck drivers, the cashiers, the stenographers, the draughtsmen and the factory workers, and upon the "everlastin' teamwork" of them all.

No one individual or department does the whole job, but by each one doing the part that falls within his reach in the best way he knows how and by each one co-operating closely with every other worker with whom he comes in contact, the great task of giving telephone service to the public is accomplished.

Let no one lose sight of the end and aim of all our efforts—Telephone Service to the Public.

The signal for disconnection increases efficient operation by enabling the operators to avail themselves of the used line for incoming calls upon the receiver being hung up, signaling the switchboard operator that the initial call is completed. An instantaneous recall enables a subscriber to promptly signal the central switchboard operator by lighting a signal lamp in front of her. The result aimed at is quicker, more accurate and satisfactory service.

It is generally conceded by all telephone managers outside the American Telephone & Telegraph Company group that these devices improve telephone service and should be adopted where manual methods of switching are continued in use.

And in the order entered the company was directed to install instantaneous recall and instantaneous disconnect features on their switchboards.

Every Independent operator and manager can feel a just pride in this recognition of Independent enterprise and progress, expressed by this decision.

The Cheapest Thing the Public Is Buying

"The cheapest thing the public is buying is telephone service."

This statement was made by Frank L. Beam at the Winona Lake convention, and few men in the business know more about it than this same Beam of Ohio, who continued:

"In spite of the fact that the cost of operation to telephone companies has increased in the past three years to a point that is almost startling, the cost to the renter has remained practically the same; at least the raise, where there has been any, has been very light.

"This fact stands out prominently in view of the high cost of all other necessities today. The percent of raise in rates is as nothing in comparison to the cost of operation. The public does not generally give this matter consideration, but they will recognize the truth of it when it is called to their attention.

"It is true that the taxes of telephone corporations have been raised 300 percent in the last ten years. The depreciation of equipment in telephone service is perhaps greater than that of any other line of business. To a great extent this is because so much of it is exposed to bad weather."

In speaking of the great progress of the telephone in this country, Mr. Beam told of the few hundred men employed in the service in Ohio in 1895 as compared with the 4,000 now employed in that state. He cited statistics showing that in 1895 there were only about 300,000 telephones in the United States, as compared with 10,000,000 now in operation in this country. In Ohio, he said, there were about 30,000 phones in use in 1895, as compared with 800,000 in use at this time in the Buckeye state.

European Telephone Practice

Translations From the Press and Communications From European Engineers

By FRED W. SCHOLZ.

Systematic Inspection of Multiple Switchboards

IF A multiple system is to remain in good condition, care must be taken that the parts subject to wear and tear be constantly controlled and replaced as the need arises. This control must be all the more rigid and the more careful the older the system in use. On the other hand the system will repay itself for this care through fewer disturbances and better service to subscribers. The following article describes a test and inspection system which has been gradually developed in the Berlin telephone exchanges, which use a two wire Siemens and Halske multiple system and a three wire Ericcson system for their service.

These tests and inspections have not been instituted at once, but are a gradual development, running over a period of years and finally terminating in the present efficient system. Inspection is taken care in part by the telephone operators themselves, partly by the supervisors, depending on the time of day when most time for this work is available and depending on the difficulty encountered in making the tests.

In case the tests cannot be made without special equipment, all the necessary keys, jacks, plugs, etc., are built into small portable wooden test sets, which can be carried to the various portions of the switchboard. The test system will be described first for a two wire multiple system of Siemens and Halske using rocking key relays and divided battery. The first tests are made by the telephone operators at the switchboard.

1. *Testing the possibility of control of the switchboard cords*: Figs. 1 and 2 give the wiring diagram for the Siemens-Halske two wire system, fig. 1 being the general wiring diagram, and fig. 2 a switchboard for incoming calls.

To test the cords for control, the listening key of a pair of cords is thrown into the inquiry position and the point of the connecting plug (a line) is used to touch the body of the neighboring plug (b-line). If a cracking is heard in the receiver at this contact, the cord is in good condition, i. e., it can be used to test subscribers' jacks for busy or open signal. This cracking noise is caused by a current which takes the following path: ground, common battery, (12 volt pole), choke coil of 75 ohm, b-branch of the pair of cords, springs of the closed listening key, body of the connecting plug, point of the second plug, the two left outer springs of the listening key brought into the inquiry position, the 1,000-ohm winding of the induction coil, the testing coil of 800 ohm, ground. This test is made twice daily, in the morning at 7 o'clock, and in the afternoon at 1 o'clock.

2. *Test of all outgoing subscribers' lines*: This test is to establish first of all good communication between subscribers, as also, whether the call is received in good shape at the second exchange. Where lines are equipped with optical systems, the tests will also establish whether the proper lamp lights up properly, when the jack is plugged by the operator.

3. *Tests of trunk connections with the long distance switchboard.* These trunks are tested for clear communication and for their immediate response to calls.

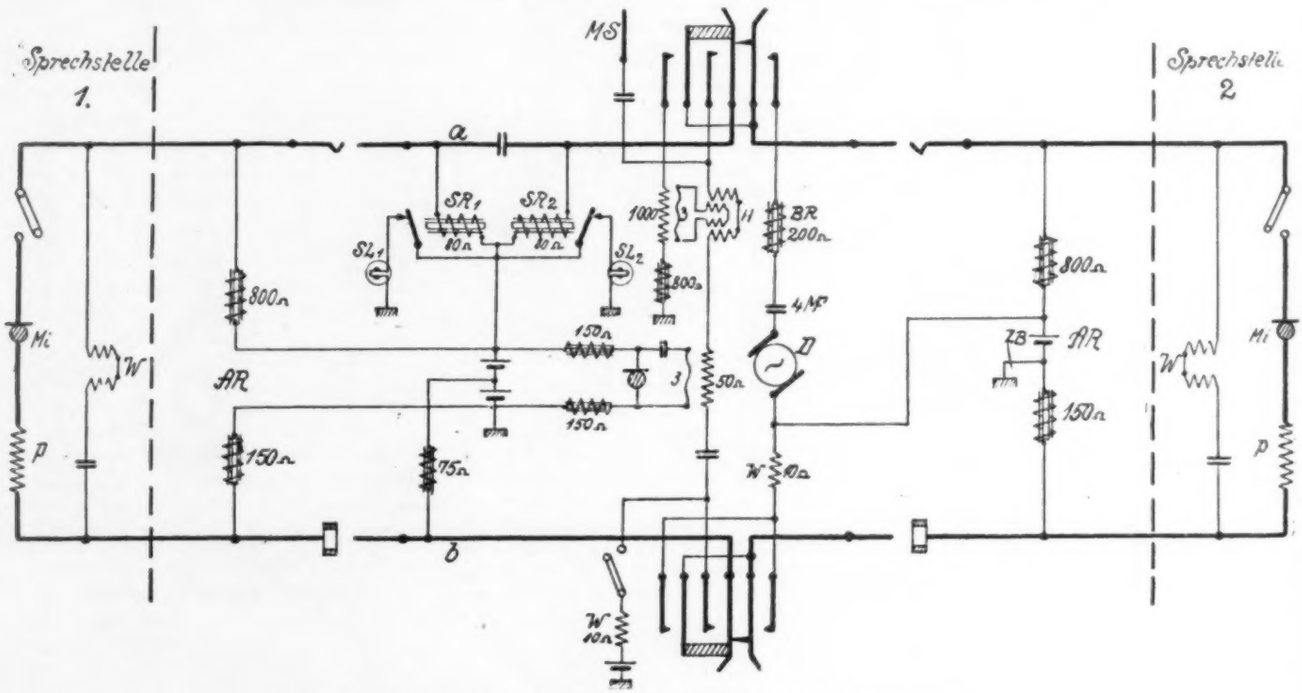


Figure 1.—General Wiring Diagram of Siemens-Halske Two Wire System.

4. *Testing the call relay*: All the subscribers' relays (rocking key relays) are tested each morning by the operators between 7 and 8 o'-

clock, each operator being equipped with a small test set. This set contains a resistance of 1,500 ohms, to whose ends are connected the conductors of a cord provided with an ordinary plug. The plug is inserted in turn into all of the jacks at the switchboard and brings about a connection of the *a*- and *b*-branches of the subscribers' line by way of the resistance of 1,500 ohms. The calling relay has to operate and the call lamp will light up. If a lamp does not light up, it must be determined whether the line shows proper "busy" control and whether somebody is speaking into the line. If the line is busy, the call lamp cannot light up when tested and the test must be repeated after the line is free. If the lamp does not light even when the line is free, then there is some trouble which must be repaired by the mechanic.

5. *Test of all incoming lines*: All incoming subscribers' lines must be tested for call control and clearness of communication as also for proper working of the final signal lamp. The trunk lines communicating with other exchanges are also tested for interoffice call, to see whether calls transmitted between exchanges are properly executed. The proper working of the flicker signal, which shows that the line is busy is also watched. These tests are made daily between 7 and 8 o'clock in the morning and for trunk lines are made once a week.

6. *Testing the cord spirals*: The spirals which protect the cord must be tested in conjunction with the b-conductor of the cord. Even though this spiral is a good protection for the cord, it happens at times that the insulating cover of the cord within the spiral rubs through and brings about a contact between copper conductor and spiral. As such a fault might bring about an injury to the operator through contact with a live current, the cords must be carefully tested for such faults. The tests differ, depending on the question whether we deal with subscribers' lines, trunks or long distance lines.

(*a*) *Subscribers' lines*: In order to test the plugs used for subscribers' lines the point of a plug known to be in good order, whose proper inquiry plug is placed in an open multiple jack, is brought in contact with all spirals of inquiry plugs at the operator's place. The white supervisory lamp must not be extinguished. If this should take place, the following circuit would have been formed: Negative pole of the common battery, closing signal relay (SR_2) (fig. 1), the long springs of the listening key, in open position, point of the connecting plug, spiral b-branch of the inquiry cord, 75 Ohm choke coil, 12 volt pole of the common battery. The clearing relay would attract its armature and the white clearing lamp would go out. Introducing the inquiry plug into an open multiple jack has no connection with the testing; raising the inquiry plug serves merely to close the proper switch and connect the clearing lamp connections.

In order to test the spirals of the connecting plugs, all of the spirals of the other plugs must be touched with the point of a plug known to be in good condition. In this case the red clearing signal lamp must not go out.

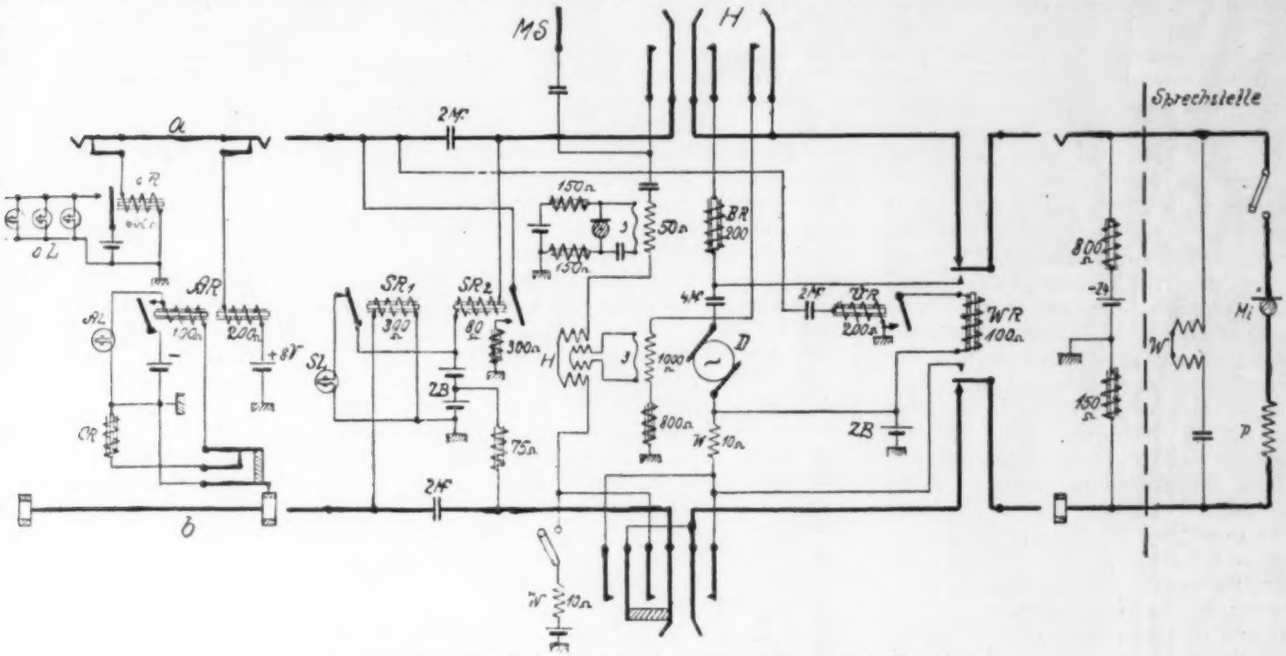


Figure 2—Diagram of Switchboard for Incoming Calls, Siemens-Halske Two Wire System.

(*b*) *Lines coming from the ordinary exchanges*: To test the inquiry plugs the body (b-part) of a well functioning plug is placed against all of the spirals of the inquiry plugs. The red clearing lamp must not go out. If this should occur, the following circuit has formed: 12 volt pole of the common battery (fig. 2), 75 ohm choke coil, the two long springs of the rocking key, body of the connecting plug, spiral of the plug, b-branch of the cord of the inquiry plug, clearing signal relay SR_1 ground. The relay attracts its armature and causes the red clearing lamp to go out. This cord is faulty and must be changed. The test for incoming interurban lines is similar to the one just described.

(*c*) *Trunk lines*: As there is no inquiry plug, tests are made by means of one loose cord with two plugs. One of the two plugs is placed in a jack whose spring and shell are connected with the *a*- and *b*-branch of the telephone line. In this way the place of the inquiry plug is filled. The proper connecting plug is inserted in order to make the clearing lamp light up. Now the body of the plug belonging to the loose cord is used to touch in succession all of the spirals of the connect-

ing plugs and if all of them are in good order, the clearing lamp must not go out. These spirals are tested every morning at 8 o'clock by each operator at her own place.

7. *Testing the pull switches of the listening cords*: The pull switch is used to connect the listening cord when inserting the listening plug into a jack. To make the test, the point of a listening plug is placed against the point of any other listening plug, the latter not being moved out of position however. Then the listening key of the plug in question is set into the calling position and thus telephone current is sent into the listening cord. If the call current lamp lights up, the pull switch of the listening cord is not set properly, i. e., it is closed, whereas in the rest position it should be open. When the pull switch is in an improper position, the following current circuit is made: From one pole of the current generator D (figs. 1 and 2) by way of the common battery to earth, from the other pole through the condensor, the battery calling relay, the springs of the switch, the listening key, the point of the listening plug, the receiver, induction coil, condensor, the improperly set pull switch, the resistance of 10 ohm back to the common battery.

8. In connection with this test the listening cord is also tested to see whether the pull switch closes properly when raising the cord. To this end the point of the raised listening plug is placed against the point of any other connecting plug and the listening key belonging to the latter is placed into the calling position. When the call current lamp lights up, proof is given that there is no interruption in the call and listening circuit, because the pull switch closes properly. The circuit is the same as described in test 7.

Tests made by Supervisors:

1. Determination of the lines in which there has resulted a shunt in the a-line or a contact between the a- and the b-line, during service on the preceding day or during night service. This test is made by the supervisor every morning at 7 o'clock. The disturbed lines are noted and reported to the repair department for attention.

2. *Current carrying capacity of cords*: Formerly the ability of the cords to carry current was tested several times during the day by touching the body of the inquiry plug with the point of the connecting plug, and vice verse. If the cords were functioning right, the white and red lamps would have to light up respectively, when the plugs were touched. The current circuit was as follows: in the former case: From the c. b. through the clearing relay SR_2, the springs of the listening key, the a-branch of the connecting plug, the point of the latter, the body of the inquiry plug, the b-branch of the latter and the 75 ohm choke coil back to the battery. In the latter case the circuit was: From the c. b. through the clearing relay SR_1 (fig. 1), the a-branch of the inquiry cord, the point of the inquiry plug, the body of the connecting plug, the long springs of the listening key, the choke coil of 75 ohm back to the battery. The clearing relays receive current when the conductors in the cords are in proper shape and the clearing lamps go out, as the relay armatures are attracted. This test has a great disadvantage that the armatures of the clearing relays on account of the low resistance in the circuit are attached with great force, cause an undue strain to the relays and frequently put them out of order. This method of testing has therefore been abandoned entirely and been replaced by the method to be described. This new test is made by the supervisors twice daily during the time of lowest traffic, between 12:30 and 1 o'clock in the afternoon and 8 and 9 o'clock in the evening. These two periods have been selected, as traffic is at its lowest at this time and because the supervisors have the least to do and can spare the time for tests. In addition it is not advisable to carry on these tests at other times, as the faulty cords must of course be cut out and it is essential for good service to have the maximum number of cords in use during busy hours.

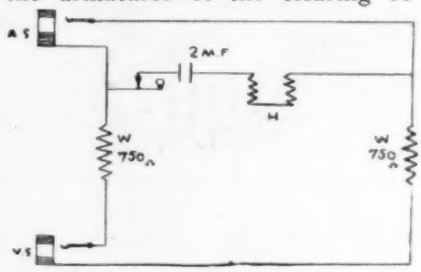


FIG. 3 TEST SET WIRING DIAGRAM

To make the tests the supervisors use a test set containing two jacks, which are connected with one another by means of a non-inductive resistance of 750 ohm. A head receiver is bridged in conjunction with a condensor and a key. Taking the plugs to be tested, the inquiry plug is inserted into the one jack AS (fig. 3) and the connecting plug into the jack VS. At the same time the key is pressed down in order to keep away the sharp click in the receiver that usually accompanies this operation. After the plugs have been inserted the following current circuit is found: Common battery (fig. 1) clearing signal relay SR1, a-branch of the inquiry cord, point of the inquiry plug, spring of the jack AS (fig. 3), 750 ohm resistance, shell of jack VS, body of the connecting plug, b-branch of the connecting cord, springs of the closed listening key 75 ohm choke coil, common battery.

Common battery, closing relay SR2, springs of the listening key, a-branch of the connecting cord, point of the connecting plug, springs of jack VS, resistance of 750 ohm, shell of jack AS, body of the inquiry plug, b-branch of the inquiry cord, 75 ohm choke coil, common battery.

If all of the cord conductors are in good condition, the closing signal relays attract their armatures and the lamps go out. Directly connected with this test there is connected a second test, which could not be carried out under the old system. This second test is for a rustling noise in the receiver and may cause quite a little trouble if neglected and reduces efficiency. This so called rustling noise occurs if the strands of the cords are not entirely broken, but only in part. Tests are made by inserting the plugs into the jacks of the test set and then shaking the cords of the corresponding plugs vigorously. If the receiver gives forth a rustling noise, some of the strands in the cord are broken, and a new cord must be supplied. The 750 ohm resistances with which the test set is equipped prevent the violent attraction of the armatures of the clearing relays and prevent damage to the relays during the tests. (To be continued.) *Telegraphen und Fernsprech Technik.*

Is It Possible to Improve on Nature

Can we improve on nature? There are instances of that being done. A famous physician once remarked that he could make a human being more perfect than the present species, if only he could put the breath of life into it. Take, for instance, the speaking telephone. It both talks and hears, and accomplishes the function of both ear and vocal organs by a mechanism actually simpler than that with which the human being is endowed for like purposes.

RECENTLY a Denver minister, in his desire to alleviate the distress of the public in at least one of the intricate causes of "poor telephone service," wrote this letter:

"Dear Telephone Company: If you will stop these long-drawn-out social conversations of the women on party lines, you will, in a great measure, obviate many verbally expressed evil thoughts that occasionally arise in the minds of some of my otherwise pious male parishioners."

"Gosh, how we'd like to," replied the commercial man. "Just the other day we had a specific complaint of this very nature, and we took it up with the party who was accused of monopolizing the party line, and this is the answer we got:

"'Maybe I do use the line considerable, but I pay for it; but the fact is that the old cat on the other branch of this line insists on talking all the time, and I can hardly ever get a word in edgeways—so there!'"

Now, parson, what's a fellow to do? Maybe you can preach 'em out of it—we can't.

* * *

"How long has that troubleman been working for you?" asked the plant manager.

"A couple of days," said the wire chief.

"Why, I thought I saw him here a year ago."

"You did; he's been here two years. I was tellin' you how long he'd worked."

* * *

A subscriber gave the wrong number in placing a call for the grocery store and she was connected with the installation department of the electric light company. She inquired: "Have you any fresh strawberries this morning?" Came the answer, "No, ma'am; but we have a nice lot of currents!"

* * *

"You wish a telephone installed in your home?"

"Yes."

"A party line?"

"No. My wife doesn't hear well enough over the telephone to make it worth while for her to 'listen in'."

* * *

When love gets to thumpin' around
in her head,
And everything seems in a whirl,
You can bet your old hat that
trouble is spread
Through the heart of the telephone girl.

* * *

A voice across the telephone
May make or mar the day.
Be careful of the tone you use,
And think on what you say.
Your pleasant smiles cannot be
seen,
Or known your kindly heart.
For people on the telephone
Are often miles apart.
The girl who answers "Central"
Has a score of lines to mind.
Mistakes are sure to happen, so
Be patient and be kind.
For life is like a garden where
Our daily acts are grown,
And as nature has ordained it,
We shall reap as we have
sown.
Then sow a smile and reap a
smile,
And in the end you'll find
That nothing pays more in-
terest
That the art of being kind.

* * *

A Colfax operator, Des Moines, answering a signal, was almost deafened by a negro woman who yelled: "Gimme de law! Gimme de law! Dey's a Mex'can woman out heah murderin' huh chullun!"

* * *

Simple Simon
Met a lineman
Going to repair.
Said Simple Simon
To the lineman,
"How long will copper wear?"

Said the lineman
To Simple Simon,
"Go ask the engineers."
Said Simple Simon
To the lineman,
"We've asked for seven years."

* * *

Everybody's guessing is it gladness,
is it mirth,
Is it sorrow, is it struggle, is it
death, is it cheer—
Everybody listens when the 'phone
rings, dear.
Everybody listens to that ting-aling,
ting;
Wondering if they know who has
made the ring.
Wondering if it's them that the call
comes for,
Wondering if it's life with its
clang, its roar,
Wondering if it's love with peace
and its spell—
Everybody listens to the telephone
bell;
Everybody listens, at the office, at

the house,
Waiting for the message, just as
quiet as a mouse;
Wondering if its meaning will be
happy or be sad,
Wondering if the answer will be
somber or be glad;
Wondering what the story is that
comes on magic wings—
Everybody listens when the 'phone
bell rings.

Photo by International.

Signor Marconi, inventor of the wireless, and Lady Marconi, sailing from England on their yacht Elettra, for an extended cruise, during which Signor Marconi will try to discover the source of the mysterious signal received recently by wireless stations throughout the world.

Photo by Keystone.

Through the receiving horn in the Times Building, New York, comes the voice of Secretary Daniels—speaking on the flagship in the Hudson River. The voice is greatly magnified by passing through the "Magnavox" so that it can be heard through the opened window by the waiting throng in the street below.

A Brooklyn rapid transit subway conductor speaking
telephone announcers. The conductor speaks in a norm
amplified, issue from megaphone announcers a

This little yacht (somewhere in France), can be operat
or from an airplane.

ay conductor speaking into one of the loud speaking
ductor speaks in a normal tone and the sounds, greatly
negaphone announcers at each end of the car.

France), can be operated by wireless waves from shore
or from an airplane.

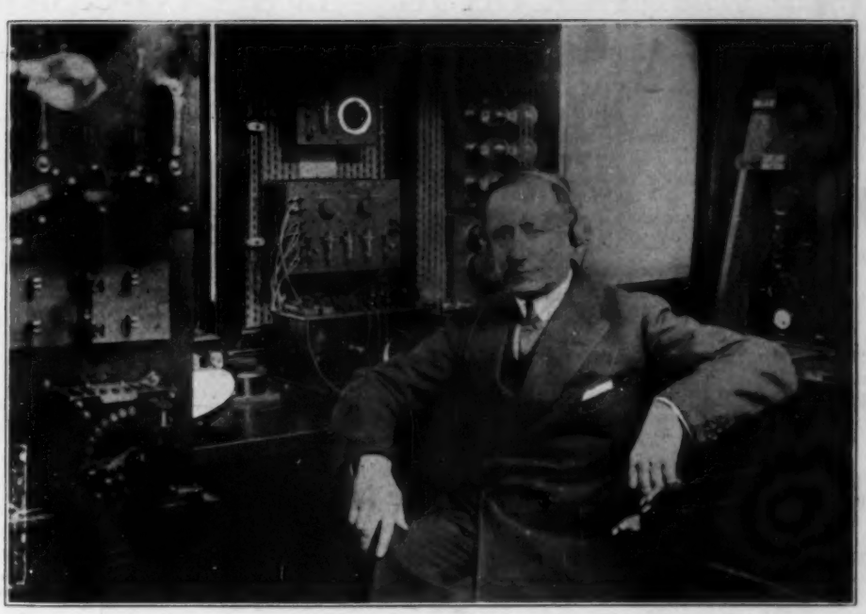


Photo by International.

Signor Marconi in the wireless room on board his yacht Elettra. The Italian scientist and inventor has had the most modern equipment, for wireless telephone and telegraph experimentation, installed on his yacht for this extended trip. The cruise will last about six months.

Photo by Keystone.

The House Military Affairs Committee has installed a radio telephone in its committee room to be used to gather information for its members. The illustration shows, the radio in operation. Left to right: William J. Fields, of Kentucky, Julius Kahn of California, and John C. McKenzie of Illinois.

Telephony as a Profession

Paper Read Before the United States Independent Telephone Association at Lake Winona, Indiana

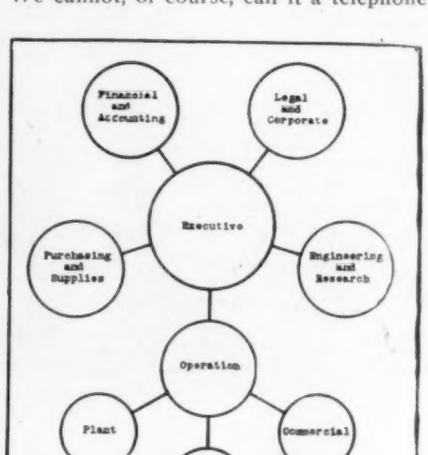
By FRANK F. FOWLE

WHEN your chairman asked me to appear before this convention today and say something about telephony as a profession, the thought rather went through my mind, Why should anybody talk about telephony as a profession to a gathering of men who are already in it and know all about it. But he said he thought it was an opportune time to say something about it. I think perhaps it was in his mind that what might be said would be perhaps of more benefit to those who were not here than to those who were, perhaps of benefit to the young men who are leaving colleges from year to year and casting about for a career. I shall not profess to say anything that you do not all know; but perhaps there are times when it is justified to repeat these things for the benefit not of those who are already in the profession and have attained rank in it but for the benefit of the young man, the technically trained man, who is about to graduate from college and wonders whether the field of telephony is worthy of his mettle.

I would like to say a word before I start to read the few remarks I have prepared, about the Western Society of Engineers. Your chairman mentioned it, and it may possibly be of some interest to you. The unrest that has been produced by the war and the pervading restless spirit of the times has really been at the bottom of the appointment of committees in all of the large engineering societies to study their activities and their service to their membership, to find out whether engineering societies are doing what their members would like to have them do, whether they are really worth while, whether they are justified or not. The national engineering societies all appointed committees to study this question, and the Western Society of Engineers of Chicago appointed a development committee last year. That committee worked throughout the year studying the past activities of the society, making a survey of the field and of the representation of the membership, and also considering whether or not there were activities which the Society might render which it did not render; and among the conclusions reached was that there was justification for establishing a telephone, telegraph and radio section of the Western Society of Engineers. That society, which is the leading local engineering society of Chicago, is organized in sections. There were originally four. There was a mechanical engineering section, an electrical engineering section, a bridge and structural section, and a section called the sanitary, hydraulic and municipal section. The development committee recommended the formation of three more sections in order to bring into the membership of the society groups of engineers who apparently were not served. Those three new sections were a railroad section, an industrial engineering section, and a telephone, telegraph and radio engineering section.

Frank F. Fowle.

This last section was organized, and its first meeting held in Chicago last month. We cannot, of course, call it a telephone engineering society, but it is the first time, I think, that any large engineering society has created a section for telephone and telegraph engineering. Chicago can certainly lay a great many claims to being the telephone center of the world, and there are many men, many engineers there, and many men in the telephone field, who it seems to me will find this telephone, telegraph and radio section of the Western Society useful and perhaps an inspiration. The plan is that those meetings will be held monthly, and as an officer of the Western Society of Engineers and a member of the board of directors I am very glad to take this occasion to extend a cordial invitation to all members of this organization to attend our monthly meetings whenever they may be in Chicago. The office of the Western Society is in the Monadnock Block. The meetings are held on the 17th floor of the Monadnock Block, and advance notices of meetings will, I think, always be found in the technical press. I am quite sure telephone men, especially those interested in the engineering end will find much of interest there.



Major Functions to Be Performed in Managing a Telephone Utility.

The field of telephony, considered as a profession offering attractive opportunities to large groups of serious minded and ambitious young men, is already some 25 to 30 years old, at least, and historically almost twice that age, but a rather careful review of the progress of the industry from its commercial inception over four decades ago down to the present day development of about 12,500,000 telephones in America, will disclose no time when the need for the trained man was ever so great as it is today, either in point of numbers or in potential capacity for service. Furthermore, there was never a time when the industry held so much of technical or commercial interest as it does today, with epochal changes taking place both in switching apparatus and transmission, and large metropolitan exchange districts expanding into areas once unheard of, each serving more telephones than there were in all America in 1895. If these reasons are not sufficient to justify the effort to say something new on an old subject, for the future benefit of the profession, the case appears to be made complete by the pervading restless spirit of the times, and the too evident occasion for reminding men and women in all walks of life that service and economy and thrift are the only means of bringing back our national sanity and peace of mind and restoring fundamentally sound conditions in our economic life.

Three decades ago the field of telephony, considered as an opportunity for a professional career, had scarcely arrived at recognition, and the industry was still a weakling, not out of its epoch of a patent-controlled monopoly under single ownership. In those days the technically trained man looked upon the business as holding out few opportunities to him beyond those in the engineering department and possibly the construction

department. How different are the conditions of today. Telephony is now one of the national giants of industry, still too much under one ownership it is true, but an indispensible factor in our modern complex life, stretching from coast to coast, from extreme north to south, and intimately touching the daily existence of every class, in city and country alike. As compared with a little group of companies under one ownership, and serving some 250,000 telephones all told, in 1890, there are today over 8,000 companies serving about 12,700,000 telephone stations, of which fully 7,750,000, or 61 per cent., are under one group ownership or control (Bell) and 4,950,000 under segregated (Independent) ownership, while 93 per cent. of the total stations are interconnected through a general toll line network for unified service. The corresponding growth in operating organization is even more remarkable than the physical growth, with the result that the field today offers attractive careers to young men in every branch of activity.

Our country today is entering the period of reconstruction after the greatest war in history, and our national problems of the day have no precedents in magnitude or difficulty. The telephone industry came through the war period with a most creditable record. It recruited the forces of the Signal Corps and furnished both the men and the materials which made this department of the A. E. F. so effective in France. It accepted the executive mandate of government control in a patriotic and co-operative spirit, and rallied to the support of the government officials entrusted with the direction of the wire service during the war emergency. When the properties were released again to their owners, the play of great economic forces loosed by the war had profoundly disturbed the normal conditions of pre-war times, and the companies found themselves facing new and serious problems. In consequence of these new conditions, especially the high cost of labor, the traditional opposition of the Bell group to automatic or machine switching has been reversed, and now it is almost universally admitted that the old type of manual operation will become largely a thing of the past as rapidly as machine switching equipment can be manufactured and the operating companies can reasonably finance the change. The tide of rising costs is also being offset in increasing measure by the rapid application of the vacuum-type repeater, which is having profound effect in extending the use and efficiency of the cable type of toll plant.

On the commercial side of the industry the question of rates for service is naturally paramount in these difficult times, and rate cases are being pressed in commission hearings throughout the country. The handling of these cases calls for special knowledge, ability and tact, and is now well recognized as a special field of its own, within the larger field of the industry as a whole. Next in order of interest, probably, is the passing of local competition in telephone service, with its attendant duplication and waste of plant, capital, organization and expense. Regulated local monopolies in telephone service, with diversified ownership and control, and connection to one country-wide toll network for universal intercommunication, may be regarded as the groundwork of a sort of telephone millenium, so to say, by which the best type of competitive spirit may be kept alive and vigorous, but at the same time avoiding the evils of telephone competition in the era since 1895.

When allusion is made today to the field of telephony as a profession offering exceptional opportunities to young men with special training or aptitude for this type of public service, a much broader meaning is implied than engineering or technical work, merely. Every branch of the art today demands trained men, that is, men equipped with special knowledge and experience in their particular lines, whether it be engineering, accounting, law construction, traffic, or something else. A glance at the accompanying diagram will serve to show how many major functions there are to be performed in managing a telephone utility. There are, of course, many specialties within each of these major functions, with ramifications becoming more extended as the organization becomes larger. This diagram, however, falls short of indicating the whole industry as a unit, because it omits the manufacturer of telephone apparatus and equipment, who is entitled to important rank. The functional diagram of the manufacturing organization would be like that of any other industry producing a highly fabricated and intricate product.

PRIDE OF ACCOMPLISHMENT
From Baltimore Bell News

Something accomplished, something done, and a sense of satisfaction in having done it. That's what counts towards happiness in our work. Have you not felt the glow of pride that comes with a job well done? And have you felt the sense of shame that comes with a job that's slighted?

Pride of accomplishment and the desire to see that things are done promptly and properly are characteristics that mark first-class men and women from the unfortunate individuals who do not care.

And you don't need to have a supervisory job before you can take a proper pride in your work. It's something to build a pole line better than the average; it's something to make connections at the switchboard more accurately, more quickly, more courteously than the average operator; it's something to write letters that are models of neatness and correctness; it's something to do a better job in any capacity than the average man or woman would do it.

In this connection we always think of a man who dug a ditch and dug it so well that a poet sang about the job. We've quoted the lines before, but just can't resist the temptation to do it again.

"His was a lowly task, he only toiled
At digging ditches through the wearying day,
And yet he worked with joy, and at the end
Of labor he could say:

"There is a ditch a man can call a ditch,
Honest as I am, built both straight and true.
No man could build it better. I'd be glad
To have God look it through."

Professional opportunities for the trained man in the telephone industry are therefore as numerous as the branches of the art or the types of function in practicing it. Furthermore, the professional traditions of the industry are exceptionally high and its problems are worthy of the mettle of men of the highest order of ability. It is a business which never stands still, but is in constant evolution as the result of discovery and invention and the pressure of economic necessity. It is also a calling which casts a peculiar spell of fascination upon those who once become absorbed in it, for such rarely ever leave it, at least permanently. There ought to be a saying, "Once a telephone man, always one." No one seems ever to have explained this interesting mystery, but a fact it undoubtedly is.

Another feature of the telephone industry worth emphasizing is its stability through periods of commercial or industrial depression. This has been demonstrated through long years of experience. Periods of depression have a marked effect upon the rate of growth of plant and traffic, to be sure, but very seldom has a company been unable to hold its own through a season of subnormal business. The significance of this to the personnel is quite evident. It must not be understood, however, that plant construction forces do not vary from time to time with the amount of work to be done, or that in measured rate exchanges the traffic forces are not adjusted to the volume of business to be handled. But even without eliminating these factors, it remains true that telephone operating companies exhibit remarkable financial steadiness during periods of depression.

It is perhaps worth while to mention, in passing, that a new type of professional man is coming into notice, namely, the man trained in management, or in preparation for executive leadership in industry, but without much emphasis on functional specialization. In the past, and even today, executives are picked from the ranks, wherever found, by no system except that of a general search for the most promising candidate. But this hit-and-miss method is destined to be displaced by a system of scientific preparation and selection, by which executives will be specially trained and selected for their work. The advantages of such a method, judged from deficiencies in the old time practice, will be as evident in telephone organizations as in any other type of utility or industrial organization that can be mentioned.

Telephony as a profession today offers a broader field and greater promise than ever before in the history of the industry, and opportunity beckons to the man, on every side. The need is for men who not only hold the highest professional ideals, but men to whom the greatest reward of their efforts is the satisfaction of doing a thing well for its own sake. A professional career in the public utility field demands a life devoted to service, with no thought of money-making for its own sake, or exploiting others for selfish ends, but to the man of the right type it offers a career full of absorbing interest and the opportunity for useful service to his fellow men in the best sense of the word.

Commercial Aspects of the C. A. X.

A Paper Read Before the Automatic Telephone Engineers' Conference in Chicago

*By R. H. BURFEIND**

MANY a wonderful invention has died in early infancy because it aimed to accomplish something not worth doing, or did it at a prohibitive cost. The patent office files are full of designs and models of entirely practical machines which do all manner of things which no one on earth wants to do, and one of the first—and bitterest—lessons a young engineer must learn is that *cost* is a vital factor in all his plans.

Nearly all things are possible. The question is: Do we want to do them, and is the result worth the price?

Now the community automatic exchange is a wonderful machine which manufactures a certain kind of telephone service, and the questions I invite you to consider are: Does the world want and need this kind of telephone service; and second, does it produce this service at a cost which the world—or that portion of the world which may want this service—is willing and able to pay?

These are the two essential selling points of any commodity. The seller must offer something that the prospective buyer wants, and he must offer it at a price which the buyer will pay. These are the fundamental commercial aspects of the community automatic exchange, or C. A. X., as it is coming to be known, and I am going to ask you to regard them not from the angle of buyers of telephone equipment, but as the sellers of telephone service. In this discussion *you* are the producers and sellers, your subscribers are the *buyers*.

THE PLACE OF THE P. A. X.

And first let us very briefly survey the telephone field, and the place which the C. A. X. proposes to fill in that field. It is not necessary to go into detail as to this equipment; that will be done in the paper which is to follow this one. Nor need we spend too much time defining the particular niche this equipment aims to fill in the telephone field. This cannot be outlined too exactly, for it may range from a little nucleus of ten or a dozen lines, up to a three or four hundred-line installation, serving 1,500 to 2,000 subscribers. Both these limits are extreme, but the C. A. X. can, under proper conditions, serve excellently well in each case.

Let us rather say, for the purposes of this paper, that when we speak of a C. A. X. we have in mind an automatic exchange of approximately 100 lines with from 250 to 500 subscribers; that it is entirely unattended except for occasional visits for maintenance purposes, and that it is connected by trunks to another exchange at which attendants are always on duty and are required there regardless of the toll, information and other calls passing over these trunks to and from the C. A. X.

I do not wish to imply that the above definition exhausts the possibilities of the C. A. X.—far from it. I simply offer it as giving the term a concrete meaning for our present study.

When the telephone first came to the village and farm, the subscribers received it thankfully. *Any* telephone is so much better than *no* telephone that subscribers were not critical.

CONDITIONS ARE CHANGING

Today, however, the farmer cannot afford to drive the old horse and rig. They are too slow and limited. For economy he uses an automobile And in villages and on farms alike, electric lights and running water are coming to be the rule.

The farmer is no longer a day laborer, toiling early and late to make a bare living. He is a prosperous business man. His brains and machines save his muscles. The nearest village no longer monopolizes his trade. His business relations extend to the larger cities, fifty or one hundred miles away.

The old style telephone no longer meets the needs of village and rural subscribers. They want, and need, a telephone service which compares in speed and efficiency with the motor car—not the horse and buggy.

But to give such service involves a radical readjustment of the customary methods of telephone operation. These grew up when the telephone was little used, when operators were glad to accept a salary of $5.00 per week, and when they were willing to work 12 hours a day for it. Night service was not expected. Sunday service was sacriligious.

Today the constantly increasing scale of wages, the universal tendency toward shorter working hours, and the shortage of operators makes it almost impossible to operate *any* manual telephone system so as to give efficient service at a cost within reason. Add to this the fact that regulating commissions are setting up standards of telephone service for village exchanges which call for 24-hour operation every day in the year, that to do this requires three shifts of operators, that minimum wage and "escort" laws are being adopted in many states, and we have the background of a problem which requires our best thought, and is worthy of it.

There is no point in arguing as to the need and demand for adequate telephone service in our smaller communities, and there is scarcely greater point in arguing as to whether the C. A. X. can give such service.

THE QUESTION OF COST

But there still remains the second part of our question: Does the C. A. X. produce service at a cost which the subscriber is willing to pay?

This cost consists essentially of these items—labor, repair parts, power, light, heat, rent, supervision, depreciation, taxes, insurance and return on the investment.

The conditions under which the C. A. X. is called upon to operate are so varied and affect the cost of operation in so many ways, that it is impossible to set forth anything like definite figures that will cover all cases. Each project must be considered by itself and a study made from its own particular data. But, summarizing very briefly the studies we have made in this direction, and the results obtained in C. A. X.'s now operating, I can say that with it rates which barely meet the essential operating costs of a manual exchange of similar size, will pay all operating costs and leave a net balance of 15 to 18 per cent of the investment to cover depreciation, taxes, insurance and return on capital.

*Manager Community Exchange Sales Automatic Electric Company.

The labor charge is the cost of a man's time three or four hours per week; repair parts, as you know, cost less than similar parts on a manual board; power costs perhaps $2.50 per month; light and heat are less than where operators are required, and rent can be reduce to a negligible figure.

But any discussion of costs involves the question of rates, one of the most difficult problems today, and one in which the C. A. X. plays a vital point. When we state that the C. A. X. justifies higher rates, we are frequently misunderstood, and the impression is spread that the C. A. X. *necessitates* higher rates. This is not the case at all. As stated before, our experience shows that at rates which barely cover manual operating costs, without any provision for capital charges, the C. A. X. can show an ample margin for fixed charges and return on the investment.

C. A. X. JUSTIFIES HIGHER RATES

When we say that the C. A. X. justifies higher rates, we have in mind the fact that many companies are at present compelled, for one reason or another, to operate with rates which are totally inadequate. For a company to attempt to raise their rates for the same service it has been rendering for ten or fifteen years, causes endless trouble and frequently involves more expense than the increase in revenue. But rates which are inadequate for manual operation are usually also inadequate for C. A. X. operation. They must be raised whether the company changes equipment or not. If, however, the company offers a *new* service, an improved service, a service which is demonstrably worth more to the subscriber by being quick, reliable, convenient and continuous, the public can see the justice of charging more, and opposition is avoided.

And now I wish to touch very briefly upon one more aspect of this cost question. We are frequently called upon to "prove in" the C. A. X. against a manual service which, in contrast with the service of our equipment, is totally inadequate. One operator at thirty dollars per month handling two or three hundred telephones, does not give much margin for saving, but it also means nearly zero in service.

There are still localities where this sort of operation is all that can be undertaken at present, and under such conditions we gracefully retire in favor of our manual friends. The C. A. X. cannot give that kind of service. It must be quick and continuous, or nothing.

BETTER SERVICE DEMANDED

But I believe—and I am confident that you will agree with me—that this sort of telephone service is doomed. It will survive for a time, and perhaps the operating companies are justified in continuing to give such service as long as they can. But the public demand is for something better; regulating commissions are insisting upon continuous operation—not simply "night-bell" service, and wage and hours of labor laws are becoming more and more general and drastic.

And when these conditions come about, there will be weeping and wailing among those who did not foresee the trend of events. Even a fifty per cent increase in operators' wages often wipes out all profit; a three or four hundred per cent increase would be a disaster.

But those companies which have installed the C. A. X. will be able to continue undisturbed. Service regulations will mean nothing to them—the service of the C. A. X. does not comply with standards, it sets them. Wage laws and hours of labor will have a negligible effect, for the labor cost is practically eliminated in the C, A. X. Their rates, once fixed on a fair and reasonable schedule, will not have to be raised again. Their profits will be secure, for while the initial investment is higher for the C. A. X. than for manual equipment, the money buys not simply so much apparatus, but it also buys freedom from disturbing elements and certainty of earnings. No one can evaluate these advantages of the C. A. X. but they constitute a real part of the value of the equipment.

Are we, then, mistaken when we say that the C. A. X. is a remarkable machine which *does* produce a telephone service not only wanted and needed, but coming more and more to be demanded, and that it produces this service at a cost the subscriber can and will pay? Are we simply dreaming when we say that this equipment can and will be used wherever adequate and efficient community telephone service is required? We believe not, and so sure are we in this belief, that we are putting behind this apparatus the best efforts and the best skill that our organization afford-

"Laryngaphone" Transmitter Worn on Throat

The "Laryngaphone," which is manufactured by the Telephone Manufacturing Company, Ltd., London, is a new form of telephone devised for rescue work in mines in conjunction with breathing apparatus. Its special feature is that it enables the worker to carry on a conversation although wearing a gas mask. The vibrations of the vocal cords during speech are collected by a transmitter strapped to the throat, which in turn reproduce corresponding vibrations in a receiver at each end of the line. The apparatus is also equipped with a signaling device, consisting of a Morse key and buzzer, which enables any pre-arranged code to be sent over the line should any failure take place in the transmitter. A lamp is also fitted which performs the double function of indicating the state of the line and repeating the Morse signals. Suitable drums are provided on which the flexible cable, specially insulated to withstand abnormal conditions, is wound; the apparatus can be used by two or more rescuers operating together.

The transmitter and receiver are made as far as possible of aluminum, and are very light, the size being only 1⅜ in. in diameter by 1⅛ in. in length. The flexible cable runs between two rollers, and on the drums a handle is fitted for rewinding. The outfit is contained in a teak case fitted with an open hinged front and lid; its dimensions are 1 ft. 3 in. by 7 in. by 8 in., and the total weight is 14 lb. When the case is lifted an auto cut-out disconnects the battery. The signaling switch is operated by pressure of the lower jaw of the wearer. The combined transmitter and receiver is contained in a weather-proof case, and is adjustable against the larynx; a flexible tube conveys sound from the receiver to the ear, and by means of moulded longitudinal grooves in the ear tube free ventilation and equal air-pressure on the ear drum is obtained.

A general diving equipment consists of a semi-automatic indicator switchboard and central battery situated in a position convenient to the air pump plant. The switchboard indicator switches correspond with the maximum number of divers who may, at any one time, be "down" together. Each diver and the pump attendant are respectively provided with a diver's equipment. The pump attendant connects the set he is wearing to the switchboard, and the cables passing through the various divers' airlines are also connected up to the line terminals on the switchboard.

The Illinois Program

An Address Before the United States Independent Telephone Association at Lake Winona, Indiana

By O. F. BARRY

A SHORT time ago I was wondering if anything that was a little out of the regular order would get by MacKinnon when this convention came. I thought that on the way down from Chicago to my home, after a very busy week. When I got home the first thing my secretary laid under my nose or eyes was a telegram from President MacKinnon asking me if I would not come and describe briefly the workings and the meetings we had with out commission and the Public Utilities of Illinois. I noticed at that time that the secretary was watching me with a good deal of anxiety, apparently. I said, "Sure, for MacKinnon," and then she brightened up and handed me the answer she had sent a day or two before.

My friends, I have been pleased with what little I have already heard. I am sorry I was not able to get here sooner. I will undertake to define just in a general way for your information some of the proceedings of the Independent Telephone Associations of Ilinois, together with the Bell Telephone Company of Illinois, and all the other utilities in that state.

It will be unnecessary for me to say to this body that the interests of all public utilities and especially telephone companies is foremost in the minds of all persons interested in them. During the time the government had the telephone companies under their control there was an uncertain condition that was very unsatisfactory to the company, for the reason they were unable to do what in many instances they deemed necessary to be done. The manner of operating was more or less changed, and made somewhat difficult. Extensions and repairs were more or less limited, and had it not been for the services rendered to these utilities by their respective representatives and particularly to the telephone interests by the representatives of both the Bell and the Independent companies it would have been far worse.

The telephone interests, and especially the Independent telephones, are under many obligations to the organization and management at Washington of our interests. Many companies during the period of the war did not feel justified in going to the government for an increase of rates for two reasons: First, it was a new practice, and they felt it more or less difficult; and, second, because they felt that if it could be avoided they should not raise their rates, while the people were being called upon in every direction to contribute to all war emergencies. The result was that many companies operated without any profit. The material necessary for the use of telephone promotion and building was taken over largely by the government, and this was another element that entered into the situation. Many felt that as soon as the war was over prices of material as well as labor would come down, and that they would be enabled to continue the service at the old rate. This proved not to be true; both material and labor increased in price after the war instead of decreasing.

Without going into detail further it is sufficient to say that all utilities, and especially telephone companies, were in great need of both funds and help, in order to continue good service, maintain their plants and increase their equipment in order to meet the demands of the people. Strange as it may seem, the demand for telephones increased very materially, and many companies were unable to procure the necessary equipment and many others were unable to procure the necessary funds for that purpose. This entire situation was taken up by the Independent Telephone Association of Illinois and discussed at its last convention, and through its board of directors and committee since that time. We arranged for a conference with the State Public Utilities Commission and discussed these matters at some length, the commission being desirous of assisting in every way possible.

The commission, realizing fully the situation and its importance, issued the following statement and order:

"The Public Utility Act provides that the commission shall have general supervision of public utilities and shall keep itself informed as to the manner and method in which their business is conducted, and shall examine such public utilities as to the manner in which their plants are operated with respect to the adequacy of their service.

"In connection with hearings now pending before the commission representations have been made as to the urgent necessity for the enlargement and extension of the plants and equipment of certain utility in order that they may be able to keep up with the demands of the public for the service rendered by them. Representations have also been made to the commission in connection with said hearings as to economic and financial conditions, which it is alleged confronting the public utilities are general in their nature, and that the ability of these utilities to meet the future demands of the public is dependent upon the prompt solution of those problems. While the commission takes notice of these general conditions, it is desirable that the specific facts relative to the financial difficulties which have been encountered by these utilities in making indispensable enlargements and extensions should be presented in order that the commission may have accurate information as to the precise situation.

"It is therefore ordered that general hearing shall be held for the purpose above stated in the hearing room of the commission, room 724 Insurance Exchange Building, Chicago, Illinois, on Thursday, April 29th, at 10 o'clock a. m., and in the hearing room of the commission in the State Capitol at Springfield, Illinois, on Monday, May 3rd, at 10 o'clock a. m., and that opportunity shall be afforded at such hearing to interested utilities, civic associations and municipalities to present evidence and suggestions concerning the subject above mentioned."

This order and request was sent broadcast over the state of Illinois to all the persons and organizations named therein.

At each of these meetings a large number of persons, including bankers, utility experts and utility operators of practically all classes were heard by the commission, and at the close of the second meeting it was determined that further hearings should be held.

The commission by general consent set another meeting for Chicago later and also at Springfield, during which time it was agreed that the several utilities would tabulate and procure in detail as much data as possible along the lines of the cost of procuring funds, etc., and the following questionnaire was prepared by a joint committee of utilities and sent to practically all the electric light, street railway, telephone, gas and water companies of the State of Illinois, which questionnaire was as follows:

1. Will you state the situation of the company which you represent here with regard to the normal growth of each one of the companies?
2. The present demand for extension and enlargements.
3. The ability to meet that demand.
4. The amount of new capital which the company would need to build the necessary extension to its plant.
5. The experience which you have had in attempting to secure new capital, and make such other observations as you may care to in connection with the present discussion.

As a result of this questionnaire it was sent to 168 electric companies, 71 gas companies, 71 electric railway companies, 46 water companies in the state outside of Chicago, requesting information as to the amount of expenditures that had been made, the amount of bonds, stocks and other securities that had been sold or had not been sold, the minimum requirements for additional capital to properly finance the companies until December 31, 1921, and requesting information as to how much money would be necessary to properly make extension and meet the demands of the public if the securities could be disposed of at a fair rate of interest.

Answers were received from 40 gas and electric companies, 12 electric railway companies and 5 water companies, and the minimum requirements for such purpose shows that $60,640,524.21 is necessary for that purpose. They further show that the amount necessary for continued normal operation is $106,501,120.50. It further shows that the amount companies should spend, if satisfactory financial arrangement could be made, is $124,823,275.50. This report further shows that the interest rate on securities to be refunded during that period runs from 5 to 10½ per cent.

The investigation further shows as to the holding of securities of this and similar class, that insurance companies hold approximately $370,000,000, and national banks approximately $296,000,000. The record does not show to any great extent the amount held by private or state banks.

While these statements and figures do not directly apply to the telephone business, yet conditions, as the record further shows, are substantially the same, and gives us a much broader vision of the situation than we could possibly have obtained if we had confined the investigation to the telephone interests.

The above facts and tabulations were made by Mr. V. R. Prather, secretary and treasurer of the Illinois State Electric Association. The record further shows in a report made by Mr. Jay G. Mitchell, secretary of the Illinois Independent Telephone Association, the following:

"In co-operation with the work of the office of Mr. Prather an identical questionnaire was sent out on the mailing list of the Illinois Independent Telephone Association, and it was also sent to the Bell company in the state of Illinois. The questions are identical with the questions sent out by the electric and other companies. Approximately 200 questionnaires were mailed and 51 answers were received. The tabulation of the answers is as follows:

"Minimum requirements for new capital consisting of the sums reported in answer to questions 2 and 3 on the questionnaire of all telephone companies reporting are $35,468,241, necessary for continued normal operation, being the sum of the answers to questions 1, 2 and 3; on the uniform questionnaire, $86,467,940. Amount companies are willing to spend being the sum of the answers received in questions 1, 2, 4 and 5, $122,990,640. Amount required for expenditures for service desired by community which operating companies would recommend, being the sum of the answers to question 5, is $36,522,700. The hearings further show that the rate of interest and cost of procuring funds to be as high or higher than reported by the other public utilities. The hearings also show that while the protection given to telephone companies and securities was very helpful and added materially to the stability and demands for such security, yet frequently in an emergency industries without regulation could pay whatever price the market demanded for money, and also that they could pay whatever was necessary to procure help and then, of their own motion, add that additional expense to the cost of the manufactured article and thus get the return on their money invested, while the public utility and especially the telephones were handicapped by the fact that under the regulation of the commission they were limited in their charges, and, therefore, before procuring the necessary funds must get an order or authority from the commission."

But inasmuch as my invitation to speak at this time was for the purpose only of giving a general idea of the character of the hearing and the general conclusions reached from it, I deem it unnecessary to go further into detail in this matter. It is sufficient to say that the first thought that came to me as a result of these four hearings was:

That public utilities of all kinds have a mutual interest, and that we have to individuals or the same class of people, franchises, right of streets and roadway. The rate, the amount of return, the class of service to the public are all mutually interested alike. The same fellow who wants to be elected alderman from the third ward will attack any utility that may be easiest for him to attack, and as a rule they are attacked by demagogues one at a time so as to perpetuate them in their positions longer.

It was the unanimous opinion of all persons taking part in these hearings that they were very helpful, not only to the commission, but to the different class of utilities. In other words, the electric light people knew more about the telephone situation than they did when the hearings began, and the telephone companies knew more about electric lights, gas, water and street railways, and with all of our troubles we concluded that we were not the only people that had some difficulties. May I epitomize the results of this hearing?

1st. We gathered from many sources a large amount of facts and figures from competent men and experts in their line that will be very helpful to us in operating and financing our respective telephone companies in the future.

2nd. That there is great need at this particular time, in order to render the best service to the public, of a large amount of funds, and that the companies will not only need to raise their rates, but many of them will need to issue additional stock or other securies.

3rd. The great need at this time of publicity. The public is not sufficiently informed as to the true situation. They get the facts mostly from persons who are antagonistic to the utilities.

4th. That there should be more co-operation between the utilities and the city authorities. The utilities should bring to the attention frequently and in a businesslike way the facts to the business men of the city and community. That class of men, as a rule, if they know the facts, will act upon them, and are willing to pay such a rate for whatever service is rendered them as it is worth, and if we expect to get good rates we should furnish good service.

5th. The different relations bteween industrial plants and public utilities was brought out very prominently and much good could be brought about by careful co-operation and understanding in the same community with the different organizations.

6th. That we should have at this time an up-to-date valuation of property, based upon the actual value of the property owned by the utility at this time, and a rate return allowed accordingly.

7th. The actual cost of money to the utilities was very fully presented.

8th. The need of a closer co-operation of utility than hertofore. If those meetings emphasize one fact above another it was that by co-operation of all utilities much more could be accomplished for each.

9th. That it is also beneficial for the commission in the several states to co-operate with the utilities of the state with which they had to do. I am very sure that these have been helpful in this respect.

10th. That wherever laws do not permit commissions to allow temporary relief, it should be so amended as to provide for the same. Our commission has recently adopted a plan of temporary relief which has been of great benefit to the telephone and other companies.

In conclusion, permit me to say I will be very glad to answer any questions regarding these hearings that I can if any of the members of the convention desires to ask them. I am glad to know that the action of our commission and our utilities has attracted some attention in other states. I believe more public hearings of this character would be very helpful to the communities in which such hearings were held, as well as to all interests represented. Representatives from business associations, chambers of commerce, retail grocers' associations, mayors and other officers of various cities all were heard by our commissions during these hearings, and their testimony indicated clearly that what the people wanted were the facts properly stated, showing that they were in need of funds to pay running expenses and a fair return upon their investment, and that they would favor such a rate.

These proceedings will be published in full by the organizations and utilities presenting the same, and I think can be obtained at an early day by addressing a letter to Jay C. Mitchell, secretary of the Illinois Independent Telephone Association, Springfield, Illinois. (Applause.)

A MAN'S PRAYER

Alonzo Burt, first vice-president and treasurer of the Chicago Telephone Company and the Wisconsin Telephone Company, has resigned and will make his home in California.

When Mr. Burt was asked what might properly be said about his retirement from active service, he replied, "Make it short and simple." Then Mr. Burt turned to a card on which was printed "A Man's Prayer," saying: "This is the kind of a reputation I would like to leave behind." Here is the prayer:

"Teach me that sixty minutes make an hour, sixteen ounces one pound and one hundred cents one dollar.

"Help me to live so that I can lie down at night with a clear conscience, without a gun under my pillow, and unhaunted by the faces of those to whom I have brought pain.

"Grant, I beseech Thee, that I may earn my meal ticket on the square, and in doing so may not stick the gaff where it does not belong.

"Deafen me to the jingle of tainted money and the rustle of unholy skirts.

"Blind me to the faults of the other fellow, but reveal to me my own.

"Guide me so that each night when I look across the dinner table at my wife, who has been a blessing to me, I will have nothing to conceal.

"Keep me young enough to laugh with my children and to lose myself in their play.

"And then when comes the smell of flowers and the tread of soft steps and the crushing of the hearse's wheels in the gravel out in front of my place, make the ceremony short and the epitaph simple—Here lies a man."

State Commission Control

An Address Before the United States Independent Telephone Association at Lake Winona, Indiana

By PAUL P. HAINES
Indiana Public Service Commission.

IT IS altogether fitting that the national convention of your association should be held in Indiana. I can say, without danger of overstatement, that the state association in Indiana must compare favorably with the best in the country. It is aggressive, has initiative, is always working in the interests of the telephone industry. It has gone far beyond what originally was conceived to be its purpose by taking up educational work of all kinds, accounting schools and plant schools, urging upon the small operator that he adopt modern methods in order that he may present his cases to the commission and conduct his business in a businesslike way. Its officers for the past few years have been men of ability, men who understood the needs of the telephone business and who understood the right and needs of the public, and who permitted these two ideas to join and gave to the association a reputation of having not only the interests of the industry at heart but also the interests of the people that the industry served. I cannot say too much for the telephone association of Indiana.

Max Hosea asked me to mention his paper that he publishes, too, but I can't do that. So I will just let that go by without any further reference.

For three years the utilities of the country have been facing continuing crises. Most of us have ben optimists. We have believed that tomorrow would bring a price reaction and lighten the burdens which are being carried by companies engaged in public service. But prices have continued to climb and burdens have accumulated.

The solution of the critical problems which this situation continues to precipitate has troubled the minds not only of the owners and operators of utility properties, but even as completely has it vexed the men who are charged with the duty of regulating and controlling them.

Loose thinking operators have said: "Why, this is a simple situation. If the public service commissions will grant and stocks greatly exceed the value of us all we ask, whenever we ask it, our troubles will end." I dare say if such a policy had been followed during the past three years by the commissions of the country the whole system of regulation would at this moment be engaged in a losing struggle against a frenzied and outraged public sentiment. The utilities would find themselves hurled back to the old destructive system of political intrigue and bargaining, councilmanic corruption and ruthless competition.

Equally disastrous results doubtless would have been experienced had the opposite policy been adopted—a policy which finds its best expression in a few municipal officials, who, with great acclaim before their constituents, demand that regardless of everything, rates be reduced to the pre-war levels and the utilities made to bear the tremendous increases in operating mosts.

Contending with these two extremes, the public service commissions of the country are endeavoring to solve the utility problem, with fairness and equity to all. It is a difficult task, for, on the one hand, many honest and sincere people, having little information and less understanding, firmly believe that regulatory bodies are controlled by the corporate interests, while, on the other hand, a few unreasoning and dissatisfied operators believe that a majority of the members of regulatory bodies are members of the Bolsheviki, and listen only to the clamor of the mob, and whose only purpose is to destroy invested capital.

I may as an aside at this time say to those who may assume that this is an exaggeration of this psychological situation which exists, that a large group of people do believe that men like myself, who are engaged in working out these utility problems in official positions, are owned by the corporate interests and controlled by the companies; and, on the other hand, there are a great many honest, sincere telephone men, who believe that men like myself, who are engaged in official work of this kind, are Bolsheviki. I hope Mr. Kelsey is here, a former editor of *Telephony*, because I should like to meet him and shake hands with him. About a year ago he wrote a very splendid editorial in that splendid magazine, in which he said that the Indiana Commission was a Bolsheviki commission, and charged us with being in close touch with all the red activities over in Russia. I say that in a facetious manner, so that I will not be misunderstood, because I would like to congratulate the fellow on the editorial. It was very good.

So it is not an extreme thing to say that this psychological situation which exists throughout the country places utility commissions in a very difficult position.

It is difficult for either of these groups of individuals to believe that the public service commissions of the country have been striving conscientiously to perform a most unpopular task with the single purpose of approximating justice to all.

It is my conviction that there has been entirely too much wailing on the part of the utilities, and entirely too little constructive effort along educational lines. We all know that the public has a common interest with the utility, that there is a natural and rightful reciprocal and mutual relationship between the producer and consumer of the utility product. In most instances, however, this relationship and mutuality of interests has been ignored or forgotten. On the one hand, some utility operators have conceived that the public was the natural enemy of all utility enterprises, and on the other hand, the public has believed that every utility was a soulless corporation, extending its tentacles everywhere to rob the people.

Before public regulation of utilities can be successful in a large way, both the utility and the public must be brought to a clearer understanding and fuller appreciation of the common interest that exists between them.

How important it is that at this moment there should be a complete and harmonious appreciation of the mutual interest of the public and the utility in their common problems.

Recent announcements of the Census Bureau disclose remarkable increases in the population of many cities throughout the land. There is hardly a city anywhere but that needs substantial additions to its water works system, to its gas system and other utility properties.

Thousands upon thousands of new homes have been built, and to these homes pipes must be laid to carry water and gas, and poles must be erected and wires must be strung to carry electricity and to give telephone service. Tracks must be built and rails must be laid to carry men to and from their work. These things are not luxuries; they are vital necessities, and in some instances

SCHWAB'S SIX RULES

Among the big men of this grand old country of ours, there are several who appeal strongly to our imagination, and one of these is Charles M. Schwab, and whenever we find Charley Schwab saying anything, we sit up and listen.

At Princeton University the other night he told, in what he termed an informal talk, what he considered the fundamental characteristics a young man must have to lead a successful life.

"Boys, you can have a good time in life or you can have a success in life," said Mr. Schwab, "but you cannot have both.

"The thing you want to do is to make up your minds what you are going to drive for and to let nothing stand in the way of its ultimate accomplishment. I am going to try to give now what seem to me to be the fundamental requirements for a successful life:

"First, unimpeachable integrity; second, loyalty; third, a liberal education in the finer things of life, of art, of literature, will contribute toward a success in life. Man needs imagination, and these are the sources for it.

"Fourth, make friends; fifth, concentrate; sixth, go at your work. You may not find yourself the first year. Don't hesitate to change from distasteful work, but don't change because difficulties come up or troubles arise."

There they are. We're not going to ask you to do anything particular about it. That's up to you.

necessities upon which the very life of the community may depend.

The public interest demands that these improvements be made. The industrial, commercial and social life of all communities demand them. The health and well being of citizens depend upon them. But such improvements can only be made by the expenditure of millions upon millions of dollars, and these millions of dollars cannot be expended unless the corporations are able to secure them, and the corporations cannot secure them unless they are able to show the financial houses from which the money must be secured that the business into which these millions are going is a solvent, healthy and profitable business. The business of utilities cannot be solvent, healthy and profitable unless the public safeguards and protects the utility by the payment of adequate rates.

In order to protect the public and to give the public vitally needed utility service, there should be expended in the state of Indiana during the next twenty-four months the sum of $88,000,000 for additions and extensions.

Practically every utility would prefer to expend no money during these months. They would prefer that their capital investment be not increased during the present critical times. But the public interest demands that $88,000,000 be expended in order to serve the needs of the public. The $88,000,000 which should be expended in Indiana during the next two years is divided between the various utilities as follows:

Gas	$ 8,000,000
Electric lighting	15,000,000
City street railways	17,000,000
Interurbans	32,700,000
Water	3,300,000
Telephone	12,000,000
Total	$88,000,000

Now, how is this vast sum of money to be raised?

Every one knows that during the past ten years utility securities have dropped from a position of preference among security purchasers to a position of disrepute. Where utility securities are purchased, they are in most instances taken by institutions and individuals in order to protect previous investments.

The credit of utilities generally is impaired to the point where only by the greatest difficulty can funds be secured. Go to the banker of any town or city and ask him if he will lend the money of his bank on the promissory note of a local utility. I dare say that only in rare cases would a utility be so fortunate. In many cases money cannot be borrowed on bonds, and when it is so borrowed, it must be accepted at such a high interest rate and such excessive discount must be suffered as to make unwise the expenditures which the loan is intended to cover.

Now what has been said does not apply alone to the watered utility, whose bonds the property, but this unfortunate condition applies with almost equal force to utilities that are soundly financed and whose aggregate securities are even less than the value of the property.

This precarious situation in which the utilities find themselves not only forbids the securing of vast sums of money for needed additions and extensions, but presages an era of economic disturbance, which unless stopped may bring general disaster throughout the land.

Therefore, we face not only the immediate problem of raising $88,000,000 for investment in utility enterprizes in Indiana and hundreds upon hundreds of millions of dollars for similar enterprises throughout the country, but we face the much more vital problem of maintaining the solvency of utility enterprises everywhere.

I contend that the first and most important step in the solution of this great problem is that the utilities of the country must teach the public to know that it is a partner in this vast enterprise—a partner who inevitably must suffer the losses and enjoy the prosperity of companies that dedicate themselves to the public service. Public confidence in utility corporations must be restored. This confidence can only be restored by the establishment of proper public relations, and this means open and above-board practices by the utility, but, more than all this, the rendering of good service.

Allow me to digress and say a word on a subject mentioned by the Senator who preceded me. Take the alderman who will attack the utility to get three or four votes. If the public in that alderman's ward understands and has been taught to know that the problem of the utility is his problem, and when the utility suffers, he suffers, the alderman cannot get the three votes and cannot be elected. It occurred to me, as I was sitting here this morning, that the utility men had failed to get the right perspective on their business; that they had for years been carrying on a business that demanded the closest education of the public without ever having opened the school house door.

There is no difference, as I can see it, between the telephone business and the need of educating the public to your troubles and their troubles and the business of the clothing merchant. Let us imaging a clothing merchant, a man who sells clothes, who must sell all of the clothes that he does sell to persons, to individuals, who have the right to elect a committee to fix the price at which he sells clothes. That is exactly what you are doing. You sell your service to people who have a right to select a committee to fix the price of your service. Now, if that is the case, is it not apparent that the people who finally must determine this thing, and upon whose good faith and upon whose good will your success must rest, must be taught to know that your troubles are their troubles, and that when you suffer they suffer, and when you prosper they prosper?

That utility that convinces the public that it is honestly and conscientiously striving to give the best service possible, and that is frank and open in its public relations, will find, in most instances, a liberal response on the part of the public. "Service first" should be the watchword of every public service company.

If, due to conditions beyond the control of the company, it is unable to give adequate service, still the public will respond liberally if it has been taught to know that the company is honestly and conscientiously doing everything within its power to give the best possible service.

Now, there are men among you, and others who are not here, to whom in private conversation I have made a similar statement, and they shake their heads and say, "That is fine, idealistic, utopian thought that that fellow puts out;" but I say to you, members of this Association, that this is not an idealistic and academic conclusion, for I have personal knowledge of many instances where the public has responded without stint when it was taught to know that the utility was striving to be a real public servant.

In one instance where a public utility corporation had been the subject of abuse and where for a period of years it had been in disrepute, it came before the public, open and above board, and told its troubles, and asked the public to be patient, and said, "We'll break our backs if necessary to render good service. There was almost an immediate response on the part of the public. The opposition was stilled and a general feeling of sympathy was developed, and in that situation and where the newspapers and the public generally had been fighting this corporation for years, the most remarkable thing in the history of utility enterprises in this country during the past three years happened—a complete revolution of thought from one of antagonism and bitterness and strife and opposition to the system, and the citizens of the city came forward with a plan initiated by themselves to grant relief to the company, without the company ever having made petition for it, and it was all the result of the psychological situation which came from the fact that that company got back the public confidence. It taught the public to know that their problems were mutual, and that company will have no difficulty in getting the largest measure of relief necessary to its own success.

This is typical. I do not mean to say that the rule will always work, but it has been my experience after hearing hundreds of cases that it is the only rule that will bring the public to a real appreciation of its co-partnership in utility enterprises.

In emphasizing the need for proper public relations and for good service as being the first essentials to a rehabilitation of the credit and welfare of public service companies, I do not mean to imply that public service commissions can escape their responsibility for maintaining the solvency of utilities.

I may add that it is not only the duty of regulatory bodies to maintain the solvency of these enterprises, but it is their duty to see to it that the utilities which they regulate are not only solvent but are healthy and profitable. It is not enough merely to let a utility exist, but it should have a compensation which will reflect itself in prosperous operation, good financial credit, healthy growth and good service. Furthermore, the utility that renders the best service and shows a deeper regard for its obligations as an agency of the public service should be liberally rewarded, just as the utility that renders poor service and has little regard for its public obligations should be restricted in its reward.

Public service commissions of the country may be depended upon to maintain the financial stability of utility enterprises throughout the land. They understand their responsibilities and have the courage to do their part in maintaining the economic well being of the nation. They understand, perhaps more than others, the real need for a deeper understanding and appreciation of the co-partnership which exists between utility enterprises and the public, and they realize their impotency to act when the public service corporation fails in its obligation adequately to serve.

Mr. President, I thank you for this opportunity. (Applause.)

Telephony and Telegraphy

Report of the Committee Made at the 36th Annual Meeting of the American Institute of Electrical Engineers

By DONALD McNICOL
Chairman

FOLLOWING out the plan adopted last year as to the form of annual report to be submitted by the committee, the following report includes references to technical progress only. The report is made up of contributions forwarded by each member of the committee.

STANDARDIZATION

During the past year considerable progress has been made in standardizing telegraph and telephone practices of the railroads of this country and Canada. Committees composed of representatives of the railroads, the commercial telegraph and telephone companies, and various manufacturers of apparatus have prepared specifications for materials, apparatus and methods which, while conforming to the generally accepted standards in each case, include special features adapting them to railroad requirements. It is expected that these specifications will be formally adopted by the American Railroad Association in the near future, and that the desired approach to uniformity of practice will soon follow.

TOLL LINE CONSTRUCTION

Toll circuits may be composed of either open wire on pole lines, aerial cable, or underground cable. Any one of these will give high grade transmission when improved equipment and methods of operation are used. Therefore, the tendency in toll line construction is to build plants which will be most economical and at the same time reduce the cases of interference to service from storm breaks and various other troubles to a minimum.

Underground cables properly installed and maintained are open to the least interference to service. However, it is not economical to place underground construction unless more than two full-size cables are required. Generally, underground cables cannot be justified except between the larger centers and their suburban sections.

Aerial cables are liable to less interference than open wires, but economy restricts their use largely to cases where the existing number of circuits and the rate of increase require extensive rebuilding, or additional pole lines to continue on an open wire line basis. Where the number of circuits will not justify aerial cable, open wire circuits must be constructed and maintained.

UNDERGROUND CABLE CONSTRUCTION

No radical changes have recently been made in engineering or construction methods involved in connection with laying of underground cables. The maximum size of cable used contains 1,200 pairs of No. 24 B. & S. gauge wires. Experimental work is being carried on for the purpose of increasing the number of wires without increasing the diameter of the cable sheath.

Troubles in underground cables have been due in part to disorderly arrangement of cables in manholes and the manner in which the splices were made. Great stress is now being laid upon the importance of having the manholes in good condition, supporting the cables in an orderly manner, and making splices with extreme care. The cost of labor required for installing underground cables is relatively small compared with the total cost of the cable in place, and therefore it is felt that all reasonable efforts should be made to install and splice the cables in such manner as to reduce the cable troubles to a minimum.

INDUCTIVE INTERFERENCE

The railroad commission of California has recently published a comprehensive work entitled "Inductive Interference," in which is given a large amount of technical information gotten together by the joint committee on inductive interference, which investigated this subject in California over a period of five years. This work makes available to interested parties a great deal of information of fundamental importance.

The activity in both the power and the communication fields since the war has demanded renewed close attention to the study of inductive interference.

The growing use of electric arc furnaces which usually produce great distortion of wave form has given rise to serious new problems in noise interference prevention.

The methods of overcoming interference with communication circuits from abnormal conditions on adjacent power circuits have not been so well developed as the methods of overcoming disturbances from the normal operation of power circuits. Constant increase in the amounts of energy carried by power circuits has also made these problems more difficult. Especial attention must be given, therefore, to this phase of interference, particularly along the line of limiting the number of abnormal conditions, reducing the length of time in which the circuits are abnormal, and in limiting the magnitude of unbalanced power currents during such abnormal periods.

Information on the subject of interference from electric railways has been increased by two or three important investigations, but is still far from complete.

RADIO SIGNALING

The year 1919 has seen the application of discoveries and inventions which were necessarily veiled in secrecy during the years of war. Under stimulus of war necessity remarkable progress was made in the application and extension of the known principles of the art, standardization of radio apparatus and of its quantity production and use. These advances were made possible by the co-operation of industrial companies, their engineers, and engineers and scientists with academic connections. The efforts of these individuals or groups were ably co-ordinated and stimulated by

the military and naval branches of the government.

Progress during the past year has been more in the nature of a consolidation of the scientific advances of the wartime than in the nature of an entry into new fields. The entire art of radio communication now stands on a firmer basis, with a greatly enlarged personnel of trained engineers and research investigators.

Radio telephone communication was maintained between the seat of government and the steamship George Washington, on which President Wilson made his European voyages. In these demonstrations the radio station at New Brunswick, New Jersey, was used.

The guidance by radio of airplanes engaged in peacetime activities is well illustrated in the directing towards landing places of the planes of the postoffice department. Communication with planes on long voyages was accomplished in the memorable voyages of the N C-4.

High-speed radio telegraphy has been greatly accelerated by the use of the Hoxie recorder and the Alexanderson magnetic amplifier. Direction-finding by radio compasses and its corollary of directive-receiving has been placed upon a firm scientific basis.

The possibility of selecting signals with reference to their direction has been successfully applied by Weagant, Wood, Taylor, Alexanderson and others to the selection of desired signals and the discrimination against atmospheric disturbances and signals of foreign stations. These principles have also permitted engineering advances in duplex, or two-way operation of pairs of stations, and in increased possibilities of multiplex transmission and reception. Knowledge and experience along the lines of duplex and multiplex operation has given added interest to the questions of regulation of wave length, range, and of the effect of legislative action upon radio development.

In the manufacturing field there has been progress not only in standardization of apparatus and in better performance, but also in the production of equipment for high power continuous-wave stations; compact and simple apparatus for medium power stations, and short range sets suitable for amateur use.

The withdrawal of military restrictions has resulted in a stimulus to amateur operation. By the encouragement of amateurs and of the research departments of the universities and engineering schools the art should attract additional workers and provide for its future the necessary increase in an enthusiastic and well trained personnel.

AUTOMATIC TELEPHONY

During the past year there was begun a movement which may become general, looking to the converting of manual telephone exchanges to automatic operation. The same movement is said to be under way in foreign countries. From the mechanical standpoint there were no outstanding improvements in automatic telephony brought into public use. Progress took the form of a general refinement of details necessary to meet operating conditions.

Operators Be Careful What You Say

We are moving fast.

The fact is indicated by the fact that the men who invented and introduced the telephone are still actively among us.

The other day in Washington a Columbus, Ohio, man in the middle fifties, fast on his feet and in his head, stepped up to the public telephone in one of the hotels and gave a number to the operator.

The young woman at the switchboard gave some facial indication or irritation, took the receiver from her ear, looked at it, readjusted the band over her head and said in jest:

"I wish I had the man here who invented this thing."

The inventor of this type of operators' headpiece was actually before the young woman.

This gray-haired man, still active, had installed the world's largest telephone exchange in Boston in 1880.

He was the man who displayed to Alexander Graham Bell the first commercial application of his own invention.

This man was Walter D. McKinney of Columbus, secretary of the Ohio Coal Exchange.

Under the direction of Thomas A. Edison, he wired the first public building ever lighted completely by electricity—the old Bijou Theater of Boston in 1882.

The introduction of general telephone exchange service into Boston was very slow.

Even by giving free service at first its use could not be induced, for merchants and bankers claimed it was an undignified means of transacting business.

It was not until telephones were also installed free in the homes of those who already had them in their business houses, and business men made accustomed to them by family communication that their commercial use was started.

Telephone Needs of a Presidential Candidate

That Marion, Ohio, the home of Senator Warren G. Harding, Republican nominee for the presidency, will be vitally interested and involved in the forthcoming campaign, goes without saying. And except perhaps for the Marion Daily Star, the candidate's own newspaper, probably no other organization will be more interested and concerned than the Marion County Telephone Company.

But the Republican camp will not be the only political center where the Dial will be a familiar equipment. Although Governor Cox, the Democratic nominee, is not a telephone man, he has long been acquainted with Automatic telephone service, both because of his having used it in Dayton, his home town, and also because the executive offices in the state capitol, which he has occupied during three terms, are equipped with lines to the Ohio State Telephone Company's Automatic system at Columbus.

Watson! This Will Have to Be Investigated

When the Nickerson telephone company proposed an advance in rates the subscribers had a meeting and ratified the proposition with cheers. While we don't pretend to know the circumstances, a fair inference would seem to be that the subscribers at Nickerson own the telephone company.

Personal Mention

Notes and Items of Interest About Men Who Are Prominent in the Telephone Industry

W. S. Vivian, vice president of the United States Independent Telephone Association, has become identified with the Automatic Electric Company, Chicago. While giving up active work for the association, Mr. Vivian will continue as

W. S. Vivian.

an officer and director and keep in touch with the association he has served so long and well. During Mr. Vivian's connection with the association it has grown from a small membership to a large and successful organization of more than a thousand members. In taking up his new duties Mr. Vivian has the best wishes of his associates and everyone who knows him.

* * *

R. L. Barry, superintendent of the Tri-State Telephone and Telegraph Company, St. Paul, Minn., died on August 14, after a three months illness.

Mr. Barry began his telephone career in Minneapolis, where he entered a clerical position for the Northwestern Telephone & Telegraph Company. He went to St. Paul about a year and a half later, in 1898, to become chief clerk for B. L. Freedy, at that time St. Paul manager of the Northwestern Telephone Company. He was soon made contract manager in St. Paul.

He became associated with the Mississippi Telephone Co., nucleus of the present Tri-State, which at the time operated toll lines only. He had been called to assist at establishment of plants in the Twin Cities and was placed in charge of construction work in St. Paul. The systems in the cities in operation, the company became the Twin City Telephone Company, with Mr. Barry as local manager. With further development of the system it became the Tri-State Telephone & Telegraph Company, and in 1909 Mr. Barry was made general superintendent, a position he retained until his death.

* * *

James McBane, general manager of the Bergholz Telephone Company, Bergholz, Ohio, has gone on an extended western trip which will include a visit to California.

* * *

A. L. Moore has recently purchased the Martinsville Telephone Company, of Martinsville, Illinois. Mr. Moore is a newcomer in the telephone field, but seems to understand the idea of making better rates for carrying on his business and building up his plant.

A number of subscribers in his district were inclined to feel that they could put in a board and operate an exchange of their own more reasonably than the telephone company, but upon investigations of prices, etc., they have decided that their telephone service is just about the cheapest commodity that they can buy.

* * *

H. J. O'Keefe, a telephone engineer, formerly of British Columbia, is now engaged in telephone work in Constantinople. In speaking of the situation in the Ottoman empire Mr. O'Keefe says: "The Turk has been running the show for the last four years, altering cables, removing plant here and adding it there, until now we are facing the most extraordinary situation any telephone company ever had, I am sure. Practically no records were kept during the war, and we have a complete system running fairly smoothly, but none of us have the faintest notion what the plant actually consists of. All the time that can be spared from maintenance is spent in making up records, and some day we hope to know exactly what we have got underground."

* * *

Frank Deebank, who has been manager of the Central Union Telephone Company at Paris, Illinois, for the last 18 months, has been given the managership of the eight Wabash Valley telephone exchanges in eastern Illinois. He will take the place of M. B. Farrell, who recently went to Waco, Texas, as commercial superintendent of the Texas Telephone Company. Mr. Deebank will have charge of the exchanges at Paris, Marshall, Christman, Elbridge, Vermillion, Redmon and West Union.

* * *

G. D. Dennis, of Nelsonville, Ohio, succeeds A. F. Willman as

G. D. Dennis.

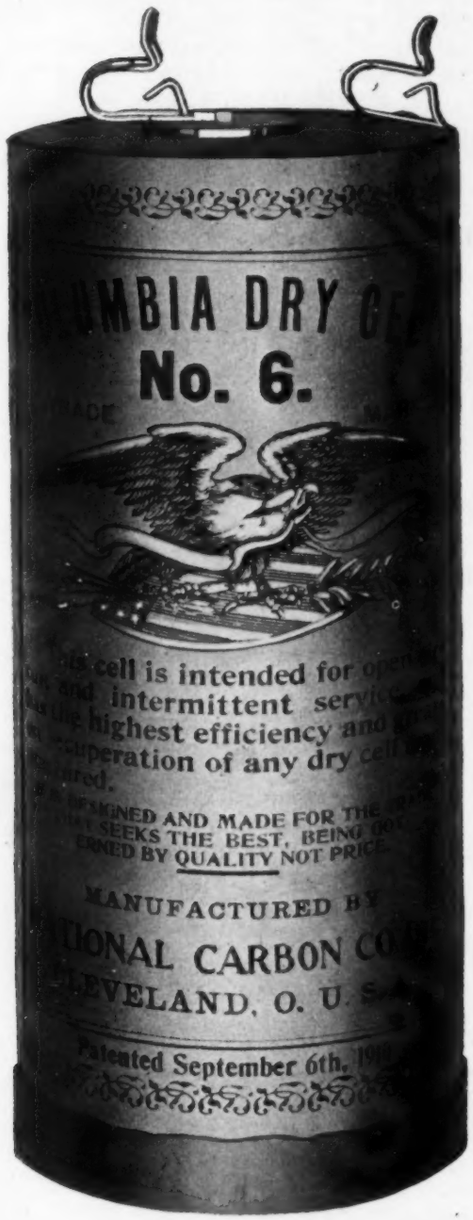
manager of the Galion (Ohio) Telephone Company.

* * *

H. M. Guthrie, former manager of the Bell telephone plant at Linton, Indiana, has been appointed manager of the Danville, Indiana, Telephone Company.

Columbia Telephone Cells

"less cost per day of service"



The nicely balanced formula upon which Columbia Gray Label Cells are built gives them power plus ***sustaining*** power. Naturally, telephone men everywhere prefer Columbias because of their unique capacity for telephone service—for conserving their strength between calls—for working at topnotch efficiency throughout their long life. Fahnestock Spring Clip Binding Posts without extra charge.

NATIONAL CARBON CO.

Incorporated

Cleveland, Ohio **San Francisco, Calif.**

In Canada: Canadian National Carbon Co., Limited, Toronto

142620

H. L. Harris, who was general manager, has been made vice president of the Kansas City Telephone Company and an executive officer of the Theodore Gary Land Company. J. G. Crane has been made vice president and general manager of the Kansas City Telephone Company and continues to be general manager of all other Gary properties.

H. L. Harris.

* * *

Edward Lawson has been elected secretary-treasurer of the Eau Claire Telephone Company, Eau Claire, Wisconsin, succeeding C. W. Cheney, resigned.

* * *

A. C. Freinmark, who has held the position of manager of the Dakota Central Telephone Company at Clark, South Dakota, for the last six months, has been appointed manager at Flandreau. Mr. Freinmark will be succeeded by S. J. Pierce, of Watertown, who has been with the Dakota Central company for many years.

* * *

Miss Loula Dye, telephone operator at Houstonville, Kentucky, prevented the looting of the Houstonville Peoples Bank. Miss Dye heard the burglars at work in the cellar and telephoned to citizens, who armed themselves and rushed to the building. The bandits heard them, jumped into an automobile and escaped in a rain of bullets. They obtained nothing at the bank. This is the second robbery of banks frustrated in Kentucky within a week by telephone operators, the other attempt being at Finchville.

* * *

C. E. Bruckemiller, for many years superintendent of the Citizens Telephone Company, Delaware, Ohio, has recently been appointed to the superintendency of the United Telephone Company, Bellefontaine, Ohio. This is one of the largest and most prosperous telephone systems in Ohio, having 23 exchanges in Logan, Hardin, Union and Champaign counties. Frank Binkley is general manager of this company.

* * *

I. N. Crawford, formerly with the Bell Telephone Company at Terre Haute, Indiana, has gone to Huntington to take charge of the Huntington telephone exchange, taking the position from which A. L. Greenman resigned some time ago. Mr. Crawford has been in the telephone business since 1904, and with the Bell telephone interests since 1912, the last seven years at Terre Haute, where he was manager. A merger of the Indiana Bell and Citizens plants at that place was made recently, and this gave an opportunity to send Mr. Crawford to Huntington.

* * *

C. C. Britton, formerly with the West Texas Telephone Company, at Ballinger, Texas, has been made manager of the Texas Telephone Company at Mart, Texas, and assumed his duties. Mr. Britton is an experienced telephone man, having been actively engaged in the business for over fifteen years.

* * *

Hugh L. Thomas, general manager of the Utah, Nevada & Idaho Telephone Company, has just completed an inspection of the company's lines in central and northern Nevada, where he says construction work has progressed favorably.

* * *

C. E. Hollander, manager of the Newark, Ohio, Telephone Company, was killed by striking a tree while standing on the running board of an automobile. Mr. Hollander entered the telephone business seventeen years ago, and by close application to business and expert knowledge of it he rose to the position of general manager of the Newark Telephone Company which he helped to organize. He was an Elk and a Rotarion.

J. W. Walton of Mason City, Iowa, has purchased the Broken Arrow Telephone Company from J. C. Jones and Mrs. McGuire, and will assume charge October 1. The new owner intends to extend the service and install new equipment.

* * *

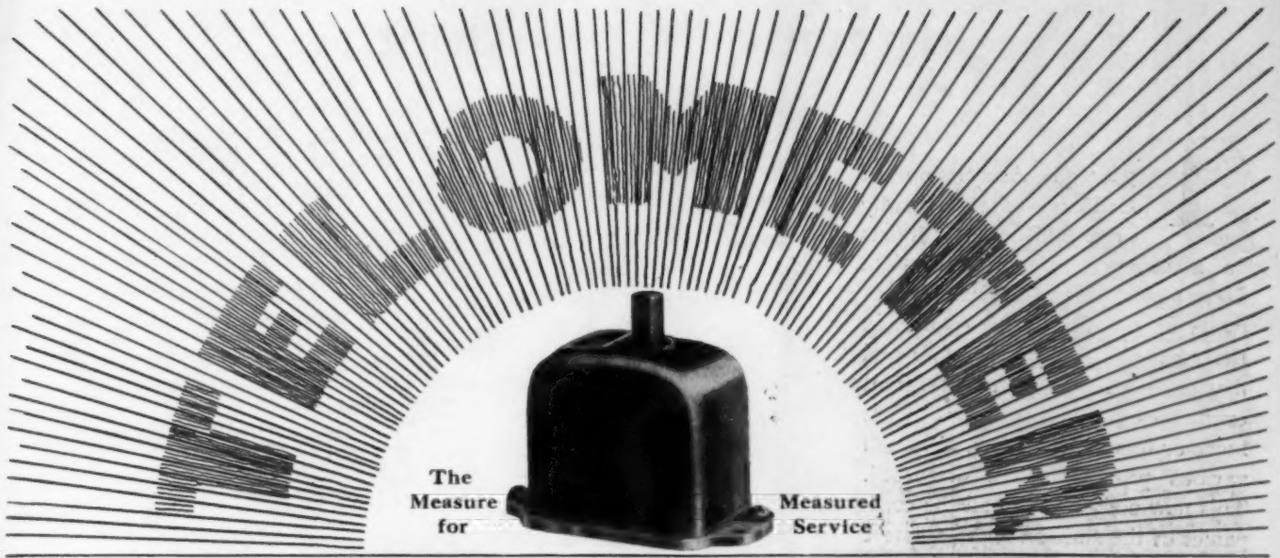
C. D. Gould, city attorney of Minneapolis, appeared before the Railroad and Warehouse Commission at the concluding session of the hearing on the application of the Northwestern Telephone Exchange Company for permanent rates. Mr. Gould made no argument but said that on the strength of the evidence presented he would prepare in the near future to push claims against the company for improved telephone service in Minneapolis if the company failed to make promised improvements. The commission took the case under advisement.

* * *

C. Echols, of Dallas, Texas, representative of the Leich Electric Company and of the Electric Appliance Company, Dallas, recently spent two weeks at Genoa, Illinois.

C. Echols.

This is the home office of the Leich Electric Company, and Mr. Echols renewed acquaintances with the management and reviewed conditions over his old stamping ground.



The DAWN of A NEW ERA

The Telephone Meter That Measures Service

Income Increased—
Profits Guaranteed
Satisfaction Assured

Send for Our Descriptive Circular

Manufactured by

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Uniontown, Pa.

Brevities of the Month

CALIFORNIA

THE Independent Telephone Association of California was recently organized and now stands as a strong business institution. Heretofore the association was made up of only the companies in the southern part of the state and met once a month at the different exchanges. The meetings were more or less social affairs, although various problems were discussed. This new body takes in all the companies of the state on an assessment basis according to the gross income of each utility. The secretaryship is a salaried office which permits employing a telephone engineer, who is capable of taking cases before the State Railroad Commission, make appraisals, and give pointers on all questions of plant and accounting. No case is put before the commission now, without first being discussed by the association body. This has a tendency to keep all practices uniform and stabilize operating conditions.

The Union Home Telephone and Telegraph Company, Long Beach, is enjoying a phenomenal growth in business due to the vastly improved service it is offering, as well as the rapid increase in population.

GEORGIA

Extensive improvements are under way at the Columbus plant of the Bell Telephone Company; $50,000 worth of copper wire has arrived, together with many rolls of large cable wire, and it is announced that other equipment is on the way. One of the first tasks to be undertaken will be to improve the line from Columbus to Atlanta and the one from Columbus to Americus. This work is to be taken up right away. Other improvements will be made of a substantial nature.

ILLINOIS

The stockholders of the Worden Telephone Company held a reorganization meeting and took steps to put new life into the corporation with a view of giving modern service. It was the first meeting of the company for two years. Officers elected for the ensuing year were A. Z. Rice, president; S. P. Williamson, vice-president; E. F. Becker, secretary; F. W. Stroecker, manager.

The State Public Utilities Commission today authorized the National Telephone and Electric Company of Clinton to purchase the telephone property of J. T. Willis in Wapella.

INDIANA

A committee composed of the following Kingman citizens: John R. Teegarden, Jos. A. Copeland, E. S. Booe, R. R. Tunin and Thos. Jackson consummated a deal recently whereby they become the owners of the Kingman Telephone Company for the sum of $6,000. This committee bought the system with the idea in view of turning it over to the people of Kingman at the price paid for it when the proper arrangements can be made.

KENTUCKY

The telephone franchise, advertised for sale by the fiscal court, was put up by Judge E. Mulcahy at the Versailles courthouse, but there was no bidder and the sale was declared off.

MARYLAND

Business men who are large users of the telephone, especially those having private branch exchanges, met at the offices of the Merchants' and Manufacturers' Association, Baltimore, to discuss the telephone situation. No definite action was taken. Decision was postponed, pending another conference which will be held in the near future, after which it is believed the business men will outline their position in the telephone controversy on rates. An official of the telephone company attended the meeting. The Public Service Commission was unable to send a representative, but will confer with the telephone users later.

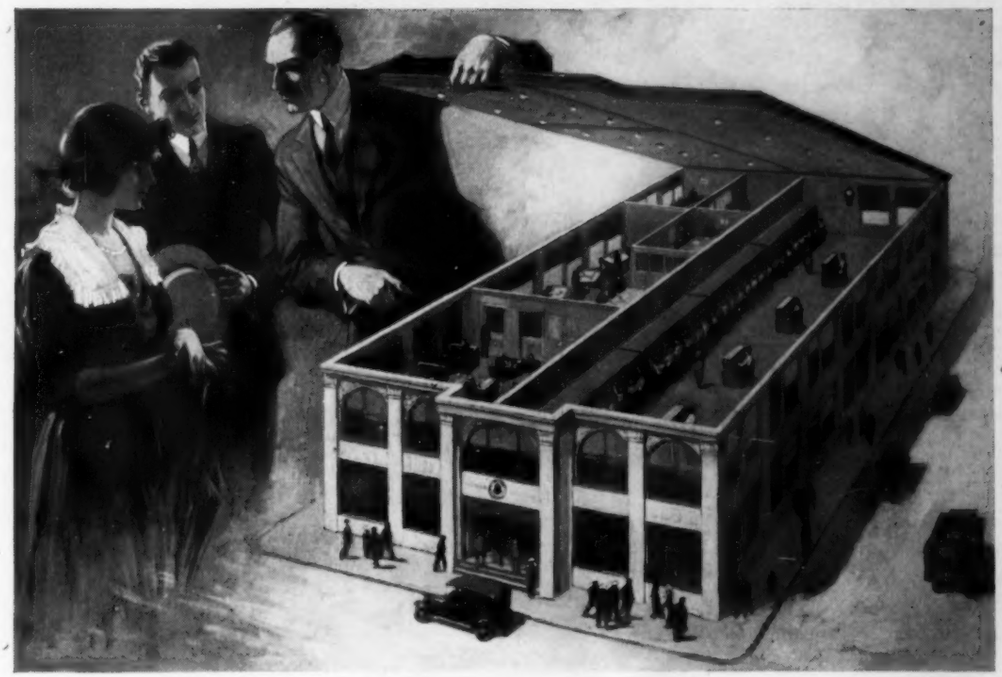
MINNESOTA

Unification of the manual and automatic telephones was effected in Minneapolis without a hitch. The fears of the telephnoe company that there might be difficulty in operation in some of the new circuits were dispelled. The operators, who have received considerable preliminary training for their duties under unification, were able to handle the multitude of calls yesterday with unexpected facility. The actual "cutover" which brought the manual and automatic system into a unit after two years of work and the expenditure of $1,250,000, was accomplished without any flourish or ceremonies. "The equipment was all in place and tested out," explained Frank Bracelin, divisional commercial superintendent. "We simply told our operators to go ahead and use it."

The capital stock of the Electric Telephone Company of Redwood Falls was increased at a meeting of the stockholders. It was decided to increase the stock from $50,000 to $100,000, a sum sufficiently large to provide funds for the erection of the new building which the company is now planning.

MISSOURI

Directors and officers for the Cape Girardeau Telephone Company were re-elected at a recent stockholders meeting. H. L. Rozier of Ste. Genevieve, who has been president of the company since its organization will again hold that position. C. W. Boutin of Cape Girardeau was made secretary and treasurer for the sixth year and John Tlapek of St. Marys was re-elected general manager. The five directors are J. J. Tlapek, H. L. Rozier, A. R. Ponder, Jas. F. Brooks, John Tlapek.



The Public Confidence

An important part of the management of the Bell System is to keep the public informed concerning all matters relating to the telephone.

We consider this an essential part of our stewardship in the operation of this public utility. It is due not only the 130,000 shareholders, but it is due the whole citizenship of the country.

We have told you of new inventions to improve service, of the growth of service, of problems involved in securing materials, employing and training workers, of financing new developments, and of rates necessary to maintain service.

You have been taken into our confidence as to what we are doing, how we do it, why we do it. You have been told of our efforts to meet unusual conditions; of how we have bent every energy to provide service in the face of storms, floods, fires.

It is an enormous task today to provide adequate service in the face of shortage of workers, raw materials, manufacturing production and transportation.

Nevertheless the service of the Bell System has been improved and extended this year. Over 350,000 new stations have been put into operation. And the loyal workers of the Bell System are establishing new records for efficiency and will establish new records for service.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy *One System* *Universal Service*

MONTANA

With the hauling of the first loads of telephone poles yesterday to the junction of the Garland and Beebe roads, near Miles City, actual construction work has begun on the eastern Montana telephone line which will stretch from Miles City to Broadus in Powder River county, 87 miles south by way of Beebe, Coalwood and other intermediate points. Laterals to the east and west of the line will also be constructed. President L. K. Hills and Manager L. P. Teague assisted in the unloading of the first consignment, Mr. Hills stating that the construction work will now be pushed as rapidly as possible toward completion. Manager L. P. Teague is of the opinion that the plans inaugurated for the work will make it possible to open telephonic communication with the south country by the time snow falls. All the supplies necessary for the building of the line are on hand and will be hauled out as needed, he stated.

Robert Scott of Cutbank, who recently bought the Eureka Mutual Telephone Company, took possession the first of the month and is now in active charge. To improve the service Mr. Scott plans to practically rebuild the exchange, putting in a larger switchboard, enclosing the city lines in cables and rebuilding wherever it is necessary.

NEBRASKA

The Boss Telephone Company of Seneca, spent $1,200 in building a toll line eight miles east to Norway, to connect with a toll line extended to the latter place built by the Loup River Telephone Company of Thedford. Now President J. L. Heilman of the Loup River company, on whose agreement to allow a connection the Boss company says it relied, has refused to permit a junction, and the Boss company has appealed to the Nebraska railway commission. The commission may seek to take jurisdiction, which heretofore has been questioned in the matter of forcing toll connections.

NORTH DAKOTA

At the meeting of the Van Hook Farmers' Telephone Company, the following officers were elected: Erick Tangedahl, president; Hans Hanson, vice-president; P. M. Shefveland, secretary and treasurer. Two new directors were elected: Henry Sands and T. J. Sjol.

A meeting of the stockholders of the Connor Telephone Company was held recently. A. H. Schuster was elected president, and Ralph Parkin secretary. It was decided to meet with representatives of the Mineral Springs Telephone Company in the near future and arrange for the connection of the two lines.

OHIO

The Northwestern Ohio Telephone Company, Wauseon, $5,000; F. C. Dunbar, W. H. Miller, M. C. Burns, A. S. Hillhouse.

A deal was consummated this week in which Emmett Geaque of Edgerton bought the controlling interest in the Hicksville Telephone Company, taking over two hundred shares at $100 a share with additional options on the major part of the remaining 131 shares. Geaque at once assumed control, the executive staff and directors resigning their positions. The new owner also owns the Edgerton, Ohio, and St. Joe, Indiana, telephone systems and will combine the three plants under his direct supervision. With this purchase the controlling stock in the Hicksville company has changed twice within a year.

OKLAHOMA

The Poteau Telephone Company at Poteau has recently purchased a new common battery switchboard and $2,400 worth of material.

OREGON

Articles of incorporation were filed by the Deer Island Co-operative Telephone Company of Deer Island. A membership fee of $15 will be charged. Articles were filed by R. E. Wilson of Maupin. The capitalization is $15,000 and the incorporators are W. E. Wilson, R. E. Wilson and Margaret Wilson. Permission to operate in Oregon was granted to the National Pole Company, a Michigan concern capitalized at $1,000,000.

PENNSYLVANIA

Philadelphia Telephone Corporation, Philadelphia, $5,000. Incorporators: W. H. and V. Gardner, and C. D. Reed, Philadelphia.

Representatives of independent telephone companies of Pennsylvania will hold meetings next month to discuss merging of various companies under the provisions of 1919, those of the eastern part of the state being summoned for Philadelphia on Sept. 9 and of the western section at Pittsburgh Sept. 3. A general plan for merging many of the 412 independent companies was discussed at a recent meeting of the Pennsylvania State Telephone Traffic Association held at Harrisburg.

The Perry County Telephone and Telegraph Company will issue additional stock to the amount of $10,675, according to plans announced by officials of the company.

SOUTH DAKOTA

W. G. Williams sold the Winfred telephone exchange to Messrs. Aldrich and Hendrickson. The former gentleman is a Sioux Falls man, and the latter resides at Canova. The new firm has taken the business over and expect to give the Winfred people first-class service in every respect. The lines in town will be fixed up, and all country lines will be put in good working order and kept in that shape.

Straight Head Telephone Company of Millenville has been incorporated by Earl W. Rogers, Hugh J. Styles and Thomas Hanlon. Capital $2,000.

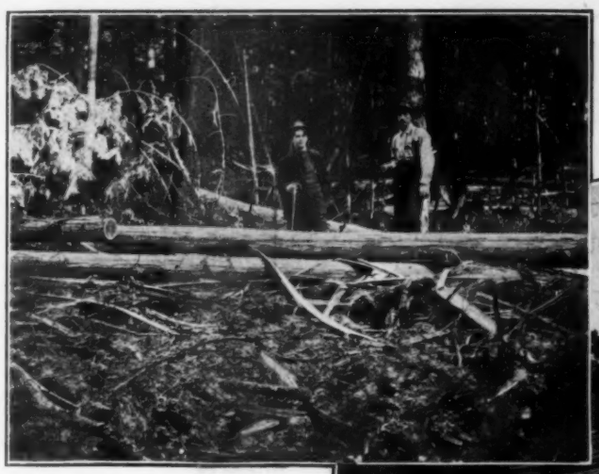
TENNESSEE

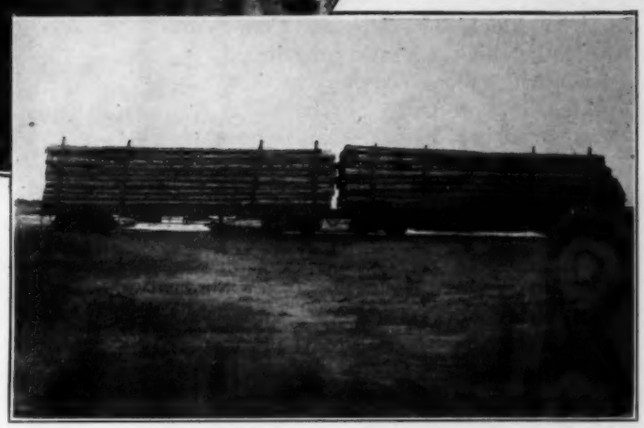
The Home Telephone Company of Lebanon has been sold to J. T. Odum. Mr. Odum states that the company will continue business as usual if the patrons show a disposition to do so.

TEXAS

The Melvin Telephone Company has purchased a new switchboard and a number of new telephones in order to take care of its increased business.

The Texas Independent Telephone Association has held two district meetings recently, one at Brownwood and one at Waco. These local meetings bring men together who are interested in the





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Western Electric POLES

To insure the maintenance of the uniformly high quality standard of Western Electric Poles, they are given three thorough inspections by our pole experts:

First, immediately after the trees are felled and stripped; secondly, when the poles are received at our yards; thirdly, when the poles are shipped out on customers orders.

It is because of this great care and thoroughness in selecting and inspecting Western Electric Poles, that we can guarantee them to be absolutely in accordance with the specifications under which they are ordered.

Large stocks of poles are carried in each of our 35 pole yards throughout the country, enabling us to make prompt shipment.

Western Electric Company

Offices in All Principal Cities

Western Electric

same problems. They also create an interest in the state associations.

Butler Telephone Company, capital $5,000. Incorporators: W. S. Wilhite, William Walker, G. E. Lipscomb, Butler.

Business men of Jacksonville, in a public meeting, have protested against the action of the telephone company which is demanding pay for service one month in advance. Inefficient service was complained of at the meeting and it was decided to refuse to comply with the demand until better service is given. A committee was appointed to report within a given time as to the efficiency of the service.

Permit to do business in Texas was granted the Mountain States Telephone and Telegraph Company of Denver, Colorado, capital stock, $50,000,000. Texas headquarters at El Paso, C. E. Stratton, agent.

The Estelline Telephone Company, Estelline, operating the independent telephone company at that place, have recently purchased a new switchboard of 250-line capacity and considerable other material and expects to put the present plant in good condition. J. B. Rothwell is the president and C. R. Wright is the manager.

T. I. Brown, manager of the Tom Bean Telephone Company of Tom Bean, and J. A. Simmons, his associate in the business, have just purchased a new switchboard of 200-line capacity; new protector rack and considerable other material, and expect to improve their plant at once.

The Texas & Pacific Railway recently commenced the installation of a telephone line from Marshall down the Louisiana division to Shreveport. It is intended to continue the line from Shreveport, Louisiana, via the Natchitoches branch to Boyce, Louisiana.

The new telephone line is to be used in handling trains in connection with the telegraph service over the division. This road has already three telephone lines out of Marshall that are used to handle its trains. One line runs from Marshall to Longview, Marshall to Fort Worth, and the third one from Marshall to Texarkana, and the fourth line will be put in on the Louisiana division.

One thousand additional lines for the new common battery switchboard, has been installed by the Clarendon Telephone Company, Clarendon. Manager Benedict states that he expects to have at least 1,000 telephones in Clarendon by January, 1921.

The Jayton Telephone Company, Jayton, has recently purchased a new switchboard and such additional material with which to improve its plant.

A new switchboard and other material has been purchased by the owners of the Lohn Telephone exchange ot Lohn, Texas, and with the installation of the new board it is expected that the service will be considerably improved.

WISCONSIN

The Citizen's Telephone Company of Green Bay is laying three 400 pair new cables 27 feet below the top surface of the Sheboygan river, since the old cables were found inadequate for the demand in service. In connection with the laying of the submarine cables the company is making improvements in its system to the extent of $140,000.

WYOMING

With seventy to eighty patrons, each of whom has paid his bill in advance in the form of a $75 subscription, the Lower Star Valley Telephone Company has been organized and will be in operation this fall.

A Successful Demonstration of Wireless

The field of science offers a wide area over which experimentation may range. It is intensely interesting to the scientists thus engaged, but greater in its force for universal good, the tests and research work now being conducted along a variety of lines promise much for the human race.

It is a matter of universal concern that wireless telephony has proceeded to that point where it may be said to have been demonstrated as a practical and useful medium for conversation and communication. When a wireless telephone message was engaged in the other day between Signal Hill in Newfoundland, and the steamship *Victorian*, 600 miles out at sea, something of an amazing nature was disclosed, and while the vessel was in communication with Newfoundland passengers heard the British National anthem sung in England a distance of more than two thousand miles.

Marconi began his wireless investigations about nineteen years ago. He at first was attracted to the wireless telegraph as a means of advancing communication. Later on, this feature having been satisfactorily developed, the world was startled not so very long ago, with the success which had came to wireless telephony. Practical experiments conducted from the Newfoundland coast have verified every claim made by science that telephony over a vast space of sea can be accomplished easily. If voices more than 2,000 miles away can be heard plainly, what is to check an advancement of the system that will double the distance at which human voices can be heard?

The test, we are informed, was substantial enough to warrant the satisfaction which followed. Such an accomplishment, of course, is easily understood in its relation to the immediate future. What wireless telephony has done in the past will seem insignificant alongside what wireless telephony will afford to the real science.

Once it was thought the heavier-than-air machine was simply the child of a distraught mind. But the Wright brothers demonstrated that criticism not always is objectionable. Out of criticism and coupled with hard work and inventive genius the airplane became an accomplished fact. The same was true of wireless experimental work.

Air telegraphy having demonstrated its possibilities, critics are slow to offer objections to telephony by wireless. We are living in a vigorous age of progression. The man who hesitates to step out and take his place alongside the big things, finds himself presently overwhelmed by the crowd that dares to endeavor, even when the attempt seems fool-hardy or impractical.